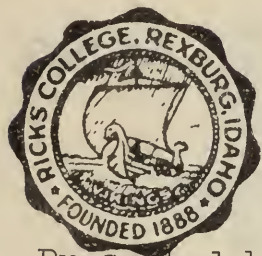


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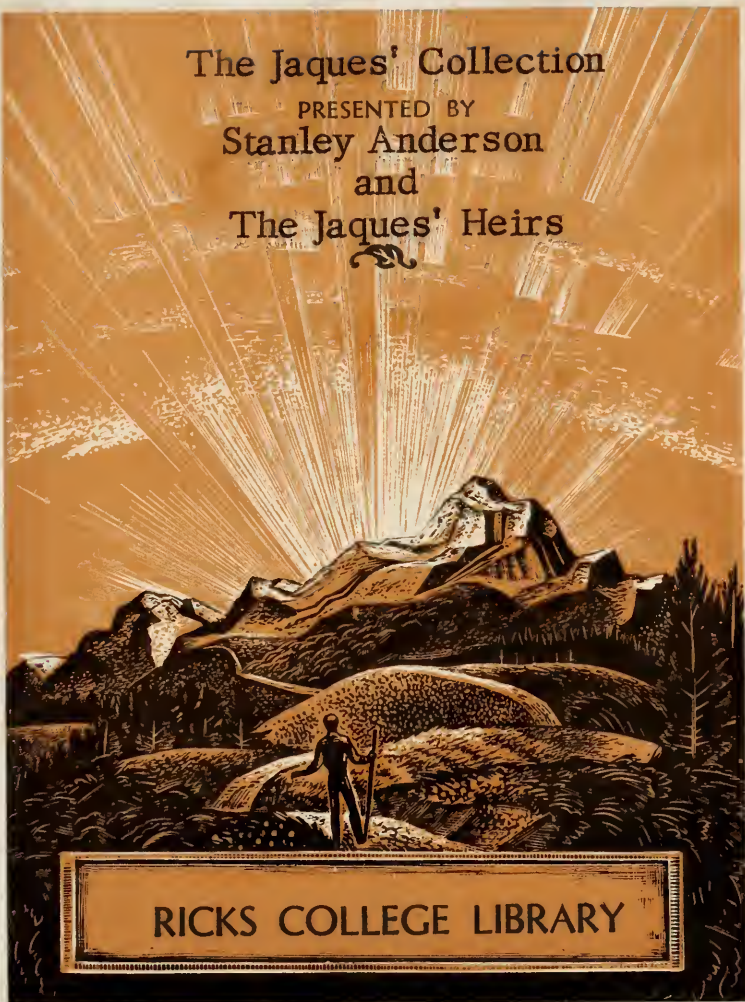
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IN

ARITHMETIC:

DRILL EXERCISES FOR REVIEW.

Prepared for the Mathematical Course of

JOSEPH RAY, M. D.,

LATE PROFESSOR OF MATHEMATICS IN THE WOODWARD INSTITUTION.

~~~~~  
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## TO TEACHERS.

---

IN order to secure the requisite drill, and make quick, ready, intelligent Arithmeticians, teachers find it necessary, at great expense of time and labor, to collect from various sources, or prepare themselves, large numbers of examples, in addition to those furnished by their adopted text-books.

Hence has arisen a desire, especially among teachers in graded schools, to secure for review and drill purposes, a work which, in brief compass, shall embrace a great abundance and variety of practical problems.

Ray's Test Examples have been prepared with a view to supplying this want, thus relieving teachers of much unnecessary labor. The work contains over Three Thousand problems, arranged in the same order and upon the same principle as the examples in Ray's Practical Arithmetic; and the Articles have reference to, and correspond with, the different Articles in that work.

This volume has been prepared by a teacher of much experience, and in fulfillment of the original plan of the author of Ray's Mathematical Series.

Much care has been taken to avoid all questions not properly belonging to Arithmetic; and it is believed that it presents greater originality and variety in the examples than any other Arithmetic published.

While it has been sought to make the problems difficult enough to test the thoroughness with which pupils have been taught, especial pains have been taken to insert no example which pupils of average capacity can not master by their own unaided skill and industry.

# TEST EXAMPLES.

## NOTATION AND NUMERATION.

### ARTICLE 13.—NUMERATION.

TO TEACHERS.—Where the word “ARTICLE” occurs in this volume, it has reference to the corresponding “ART.” in “Ray’s Third Book.”

*To be copied, separated into Periods, and read.*

37	4000	40000	670000	560000913
200	2604	40050	306000	3100060040
130	3006	50076	800400	10060500008
805	8436	30904	700020	2002000
990	3567	70480	100009	7060000982
303	3452	50002	246000	450026003
330	7001	81000	330700	83261090800
333	2350	90300	480010	600057
995	9800	50760	520004	8000067839
420	3904	68009	701090	12001200
407	9206	70504	802004	1908080808
1009	3400	33003	900870	7300000073
1200	6000	70026	100803	2067804000
1004	4005	50080	200045	5037008
3058	3296	99009	300829	7020674900
4607	9090	90099	408064	80070406
3990	2468	23456	501904	309080000
7006	3579	18206	604310	4077007700
8800	1008	90010	790608	92349906
8209	9304	38007	810049	283465000
6340	2906	40609	920430	1320008091

6734825	926427	8386834
405060700	2764000038	24360004008
8365007766	130800890	68400000295
3426000090	3705600047	7382650043
523808705	4064843800	463852900
84167094	6003573504	80000066006
6666050830	272290000	7808758800
20003002	8011370056	306000231
1101020621	3000084	90407804209

## ARTICLE 15.—NOTATION.

1. Eighty. Seventy-four. Fifty.
2. One hundred and sixty-four.
3. Nine hundred and seven.
4. Five hundred. Two hundred and thirty.
5. Three thousand seven hundred.
6. Nine thousand and eight.
7. Four thousand two hundred and five.
8. Five thousand and sixty-five.
9. Seven thousand, two hundred and forty-six.
10. Forty thousand and ninety.
11. Twenty thousand and thirty-six.
12. Sixty thousand, two hundred and seven.
13. Fifty thousand, eight hundred and forty.
14. Ninety thousand and four.
15. Eighty-five thousand.
16. Forty thousand three hundred.
17. Twenty thousand, one hundred and sixty.
18. Ninety-three thousand and seven.
19. Seventy thousand, two hundred and eight.
20. Sixty-seven thousand and nine.
21. Fifty thousand and forty-seven.
22. Eighty-four thousand nine hundred.

23. Forty-six thousand, two hundred and twenty.
24. Ninety thousand and eighty.
25. Two hundred thousand.
26. Three hundred and twenty thousand.
27. Five hundred and one thousand.
28. Four hundred thousand, one hundred.
29. Six hundred thousand and seventy.
30. Seven hundred thousand and five.
31. Seven hundred and sixty-two thousand.
32. Four hundred and twenty thousand, two hundred.
33. Five hundred and seventy thousand and thirty.
34. Eight hundred and ten thousand and two.
35. Nine hundred and three thousand, seven hundred.
36. Two hundred and six thousand and forty.
37. Five hundred and three thousand and eight.
38. Three hundred thousand, four hundred and ten.
39. Nine hundred thousand and twenty-five.
40. Seven hundred and one thousand, six hundred and seven.
41. Three millions, twenty-four thousand, one hundred.
42. Ten millions, two hundred thousand.
43. Four millions, one thousand, five hundred.
44. One million, ten thousand and twenty.
45. Five hundred millions, and forty thousand.
46. Ninety-six millions, six hundred and seventy-one.
47. Forty millions, two hundred and ten thousand.
48. Six hundred and twenty-nine millions, one thousand and twenty-eight.
49. Fifty millions, thirty-six thousand and one.
50. Two hundred and five millions, sixty thousand.
51. Seventy-one millions, and eight hundred.
52. Sixty millions, fifty thousand, two hundred and six.
53. Four hundred and twenty millions, eighty-nine thousand and fifty-six.



54. Thirty-one millions, three hundred thousand, four hundred.

55. Two hundred and eighty-seven millions, six hundred and fifty-four.

56. Nine hundred and three millions, sixty-one thousand, two hundred and nineteen.

57. Six hundred thousand, two hundred.

58. Six hundred millions, two hundred.

59. Eighty-eight millions, two hundred and ninety-one thousand, four hundred and one.

60. Fourteen millions, forty thousand, four hundred.

61. One hundred millions, one thousand and ten.

62. Twelve billions, two hundred and fourteen thousand, nine hundred and fifty.

63. Two hundred billions, ten millions, eighty-three thousand, six hundred and ninety-nine.

64. Nineteen billions, two hundred and four millions, eight hundred and fifty-three.

65. Three hundred and fifty-nine billions, six hundred and thirty-seven thousand.

66. Five hundred billions, forty millions, two hundred and one thousand and eighteen.

67. Three billions, ten thousand, six hundred.

68. Six trillions, seven millions, eight thousand.

69. Seven hundred and twenty trillions, two hundred and nine billions, seven thousand, five hundred and eighty-six.

70. Thirty-nine trillions, three hundred and fifty-nine thousand, two hundred and sixteen.

71. Sixty billions, three millions and ninety.

72. Thirty trillions, seven thousand, four hundred.

73. Six hundred and seven trillions, eighty billions, seventeen thousand and seventy.

74. Eighteen quadrillions, and four millions.

75. Sixty quadrillions, two hundred and sixty billions, seven hundred and eight thousand.

## ARTICLE 22.—ADDITION.

(1)	(2)	(3)	(4)
47365	373426	9876594	789789
8234	19	8765985	417
91785	4735	7659876	87654
426	86209	6598767	47
3134	7794097	5987658	982946
88888	36348	9876599	3828
<hr/>	<hr/>	<hr/>	<hr/>
(5)	(6)	(7)	(8)
6234586	9476314	9467945	3426719
787873	85687	6784234	5725436
9384757	327461	853425	6284375
46588	1928374	9846867	407078
8910119	6519283	1234567	6742866
692851	7465819	345678	42765
<hr/>	<hr/>	<hr/>	<hr/>
(9)	(10)	(11)	(12)
6258764	5678961	3476951	2986298
35786	483265	46258	987654
7549672	9643872	759496	98765
4289	29	8678678	9876
6897547	7836438	6786786	987
387	295295	7867867	98
9685488	3873878	5436	4986786
<hr/>	<hr/>	<hr/>	<hr/>
(13)	(14)	(15)	(16)
784656	9435621	999654	4628537
8325864	8462738	974328	9837461
56475	6548394	5387	7824619
896453	3782615	346	6436534
6700045	564379	683968	5371463
8399964	1537262	25672	162539
428986	3451606	994613	3563466
<hr/>	<hr/>	<hr/>	<hr/>

(17)	(18)	(19)	(20)
4256378	457682	853427	13717191
9998314	3873459	9998351	12509135
5673474	6286478	9146573	6734825
5743622	345	7374865	4376286
4156738	925846	937948	6271537
1686	8738562	1649	3276447
4326526	146473	2625135	5623714

(21)	(22)	(23)	(24)
4837265	1427386	4723564	3377996
8321749	684397	8123456	4238317
4567891	9943738	3873873	6538739
2345678	6463827	8738733	6283838
9123456	56262	7387387	7347347
7891234	3536173	4564564	3473473
5678912	9876543	5276436	5761683
3456789	4265438	1876544	4716162
1234567	123457	1261262	2652653
8989898	5734562	6126127	6526527

25.  $37654 + 46725 + 42738 + 62435 + 53274 = \text{what?}$
26.  $44556 + 38237 + 3939 + 483 + 56789 = \text{what?}$
27.  $98765 + 87654 + 76543 + 5432 + 77777 = \text{what?}$
28.  $59487 + 6385 + 99 + 847 + 98568 = \text{what?}$
29.  $75658 + 49 + 57568 + 383 + 86575 = \text{what?}$
30.  $4985 + 49856 + 498567 + 39 + 88888 = \text{what?}$
31.  $67358 + 45937 + 86229 + 67834 + 32642 = \text{what?}$
32.  $79364 + 837293 + 79 + 5327 + 77932 = \text{what?}$
33.  $99999 + 88888 + 77777 + 66666 + 555555 = \text{what?}$
34.  $94495 + 67389 + 13247 + 604 + 70057 = \text{what?}$
35.  $4638 + 7783956 + 887264 + 93768 + 8989898 + 63 + 76767 + 826531 + 1782 = \text{what?}$
36.  $756845 + 67842 + 9983 + 7656873 + 2 + 6784 + 73949 + 675864 + 33 + 287596 = \text{what?}$

37. Add seven hundred thousand and four; sixty thousand four hundred; five millions, eight thousand and sixty; 912875; thirty thousand and forty-nine; seven hundred and seven thousand, nine hundred and six.

38. Add 487925; six millions and eighty-four; five trillions, seventy millions, six hundred thousand and nine; four quadrillions, eighty trillions, ninety thousand, eight hundred and eighty-eight; 477333879646; thirty-seven trillions, ninety billions, four hundred millions, six thousand nine hundred and forty.

39. John has 49 marbles; William, 63; James, 104; Thomas, 95: how many have all?

40. A man paid for flour \$655; for pork \$478; for beef \$508; for sugar \$89; for cheese \$70: what did all cost him?

41. I paid one man \$349, another \$961, and have left \$428: how much had I at first?

42. By selling a farm for \$6479, the owner lost \$2734: what did it cost at first?

43. There are four cities whose population is as follows: 147321, 100677, 682394, and 42001: how many inhabitants in all?

44. The first of three numbers is 356, the second is 19 more than the first, and the third 88 more than the second: find the sum of the three.

45. At an election for governor, Jones received 87209 votes, Brown 63289, and Thompson 31927: how many votes were cast?

46. A bankrupt owes to one man \$853, to another \$467, to another \$666, to another \$98, to a fifth \$982: how much does he owe the five?

47. A grocer lost \$957, and had left \$5635: how much would he have had, if he had gained \$957, instead of losing?

48. The population of a village was 1527, the next year it gained 421, the second year 923, the third 845,

the fourth 1760, the fifth 1099: what was the population at the end of the fifth year?

49. What is the sum of all the numbers below 20?

50. Two men started from Cincinnati: one went east the first day 109 miles, the second day 131 miles, the third day 97 miles; the other man went west, the first day 42 miles, the second day 33 miles, the third day 48 miles: how far apart are they at the end of the third day?

51. A firm pay out during the year, for rent \$1750, for book-keeper \$1200, for clerks \$1880, for freight \$947, for drayage \$247, for taxes \$529, for repairs \$98, for fuel, lights, and postage, \$793: what was the total expense?

52. Commencing with 20, what is the sum of all the numbers below 35?

53. In a school 123 pupils read in the Fifth Reader, 147 in Fourth Reader, 165 in Third Reader, 201 in Second Reader, 129 in First Reader, and 193 in Alphabet: how many pupils in school?

54. There are five numbers: the first is 349, the second 468, the third is equal to the sum of the first two, the fourth to the sum of the first three, and the fifth to the sum of the other four: find the sum of the five numbers.

55. At a certain port there arrived 43671 persons from England, 263959 from Ireland, 185964 from Germany, 14869 from France, 6877 from Italy, 18206 from Spain, and 982 from Sweden: what was the immigration at that port, from the countries named?

56. A contractor built six houses: in the first were 30758 bricks; in the second, 5 more than in the first; in the third, 89 more than in the second; in the fourth, as many as in the first and third; in the fifth, as many as in the second and fourth; in the sixth, 83 more than in the third: how many bricks in all?

57. What is the sum of all the numbers under 150, whose unit figure is 7, including 7 itself?



58. A grocer bought 10 barrels of molasses containing respectively 42, 44, 44, 41, 39, 43, 42, 42, 42, and 41 gallons: find the contents of all.

59. From a number 576 was taken, and there remained 425: what was the number?

60. Write 67853 eleven times and add.

### ARTICLE 27.—SUBTRACTION.

1. From	4476	subtract	2568.
2. From	64043	subtract	12305.
3. From	23527	subtract	11634.
4. From	34529	subtract	14643.
5. From	1000467	subtract	37538.
6. From	3300001	subtract	223642.
7. From	10000000	subtract	534629.
8. From	31313146	subtract	3333333.
9. From	40004000	subtract	654001.
10. From	43618275	subtract	3904896.
11. From	1263748256	subtract	818181818.
12. From	65237816	subtract	18297508.
13. From	4356287	subtract	358297.
14. From	42342342	subtract	56756.
15. From	30000000	subtract	23410852.
16. From	42638516	subtract	15386729.
17. From	37340064	subtract	9999998.
18. From	646464645	subtract	167866786.
19. From	3543333345	subtract	541667782.
20. From	6111122222	subtract	710343816.
21. From	9400000000	subtract	1600456789.
22. From	6235149621	subtract	2314964751.—
23. From	9123123123	subtract	453087.
24. From	72114391165	subtract	69161438967.
25. From	9423234236	subtract	9423161719.

26. From 7724351627 subtract 4956738.  
27. From 3334445556 subtract 2954445493.  
28. From 23842679341 subtract 77995696.  
29. From 4246525662 subtract 4245668619.  
30. From 6453216420 subtract 600458438.

31. From four millions, seven hundred thousand, three hundred and sixty-five, take 779329.

32. From four trillions, four hundred and twenty-seven millions and eighty, take 397458199627.

33. From six hundred billions, nine millions and five hundred, take seventy-five billions, forty millions, eighty thousand and fifty-nine.

34. From eighty trillions, eighty billions and eighty, take 7856493650108.

35. From 180087423290607, take ninety trillions, three hundred and nine billions, five hundred and six millions, three hundred thousand, eight hundred and fifty.

36. From 3 units of the seventh order, take 490609.

37. A man sold a house for \$5000, gaining \$1246: find the cost of the house.

38. The population of one state is 1990547, of another 877039: how many more inhabitants in the first than in the last?

39. A foundry had 50000 bushels of coal, of which 17085 bushels remain: how much has been used?

40. How many more pages in an encyclopedia of 1960 pages, than in a dictionary of 1326 pages?

41. A man died in the year 1836, at the age of 93 years: in what year was he born?

42. The expenses of a store were \$5960; and the goods were sold at an advance of \$28270: what was the real gain?

43. From 1001 take 327 twice.

44. From one million, four thousand and fifty, take 187394 four times.

45. From 1001042107 take 151040609 six times.

46. From 275600401653 take 30402600804 eight times.

47. From 3333333333 take 333333333 nine times.

48. From 1234567891 take 123456789 ten times.

49. From 43021 subtract the sum of 3798 and 30247.

50. A man worth \$19000 lost at one time \$3427, and at another \$1946: how much was he then worth?

51. A man sold a house for \$3927, losing \$733: would he have gained or lost by selling it for \$4509, and how much?

52. C and D commenced business with \$3000 each: C lost \$281, D gained \$513: how much more is D now worth than C?

53. A man having \$406, paid \$30 for clothing, \$73 for board, \$19 for books, and a debt of \$203: how much had he left?

54. To the difference between 5231 and 7453, add the difference between 5231 and 3547.

55. John has 240 marbles, William 117; John gives William 52: how many more has he then than William?

56. In a town, 327 houses were built during the year, and 3 destroyed, when it was found that the town contained 1563 houses: how many had it at the beginning of the year?

57. William was born in the year 1823; John was born 16 years sooner, and died at the age of 52: in what year did he die?

58. A has 27 marbles more than B, and 35 less than C; C has 282: how many have the three?

59. From the sum of 9327 and 4683, subtract their difference.

*Test Examples.—2*

60. A had \$3958, B \$1463: A lost \$1365, B gained \$1165: which then had the most, and how much?

### ARTICLE 31.—MULTIPLICATION.

- |                                   |                                      |
|-----------------------------------|--------------------------------------|
| 1. $257 \times 4 = \text{what?}$  | 10. $678456 \times 3 = \text{what?}$ |
| 2. $252 \times 7 = \text{what?}$  | 11. $608089 \times 5 = \text{what?}$ |
| 3. $729 \times 8 = \text{what?}$  | 12. $726986 \times 6 = \text{what?}$ |
| 4. $641 \times 9 = \text{what?}$  | 13. $923475 \times 7 = \text{what?}$ |
| 5. $4682 \times 5 = \text{what?}$ | 14. $637479 \times 9 = \text{what?}$ |
| 6. $7497 \times 6 = \text{what?}$ | 15. $568902 \times 7 = \text{what?}$ |
| 7. $4538 \times 8 = \text{what?}$ | 16. $780780 \times 5 = \text{what?}$ |
| 8. $9898 \times 9 = \text{what?}$ | 17. $697685 \times 6 = \text{what?}$ |
| 9. $6976 \times 8 = \text{what?}$ | 18. $987654 \times 7 = \text{what?}$ |

19.  $156274368 \times 11 = \text{what?}$

20.  $784693857 \times 9 = \text{what?}$

21.  $658765878 \times 10 = \text{what?}$

22.  $987654321 \times 9 = \text{what?}$

23.  $457968431 \times 11 = \text{what?}$

24.  $999888777 \times 12 = \text{what?}$

### ARTICLE 32.

- |                                    |                                      |
|------------------------------------|--------------------------------------|
| 1. $423 \times 13 = \text{what?}$  | 13. $5693 \times 123 = \text{what?}$ |
| 2. $239 \times 22 = \text{what?}$  | 14. $6009 \times 314 = \text{what?}$ |
| 3. $685 \times 45 = \text{what?}$  | 15. $7581 \times 643 = \text{what?}$ |
| 4. $698 \times 47 = \text{what?}$  | 16. $8456 \times 719 = \text{what?}$ |
| 5. $708 \times 64 = \text{what?}$  | 17. $7563 \times 249 = \text{what?}$ |
| 6. $859 \times 76 = \text{what?}$  | 18. $5785 \times 439 = \text{what?}$ |
| 7. $586 \times 89 = \text{what?}$  | 19. $6896 \times 548 = \text{what?}$ |
| 8. $495 \times 78 = \text{what?}$  | 20. $7987 \times 625 = \text{what?}$ |
| 9. $769 \times 69 = \text{what?}$  | 21. $9769 \times 846 = \text{what?}$ |
| 10. $858 \times 87 = \text{what?}$ | 22. $8658 \times 935 = \text{what?}$ |
| 11. $856 \times 48 = \text{what?}$ | 23. $6736 \times 694 = \text{what?}$ |
| 12. $767 \times 91 = \text{what?}$ | 24. $7847 \times 898 = \text{what?}$ |

- 25.  $83008 \times 4261 = \text{what?}$
- 26.  $90093 \times 70075 = \text{what?}$
- 27.  $46208 \times 60504 = \text{what?}$
- 28.  $900009 \times 4004 = \text{what?}$
- 29.  $653406 \times 770099 = \text{what?}$
- 30.  $920004 \times 600706 = \text{what?}$
- 31.  $7429634 \times 278452 = \text{what?}$
- 32.  $42376856 \times 5378447 = \text{what?}$

33. If a road is 383 miles long, how many miles will a man travel in passing over it eight times?

34. A man owes to each of nine persons \$475: how much does he owe them all?

35. Seven merchants bought a lot of flour, and, on dividing, each had 847 barrels: how many barrels in the lot?

36. If a man save 135 cents a day, how much will he save in a year containing 365 days?

37. How many bushels in 305 loads of coal of 25 bushels each?

38. In a farm there are 37 acres, worth \$295 an acre: what is the whole farm worth?

39. A merchant bought 56 hogsheads of tobacco, weighing 785 pounds each: what the entire weight?

40. What would be the cost of 47 miles of railroad, at \$31725 a mile?

41. If a hotel consume 213 pounds of beef daily, how much will it consume in one year of 365 days?

42. A temple has 86 columns each weighing 2753 pounds: what is the weight of all?

43. A man having 207 hogs, bought 65 more, and then sold all at \$14 a head: what was the amount realized?

44. A man sold 41 barrels containing 35 gallons each, at 44 cents a gallon: for how much did they sell?



45. A man bought 45 acres of land at \$375 an acre, and sold the entire piece for \$15000: did he gain or lose, and how much?

46. At \$507 apiece, how much more will 297 carriages cost than 133?

47. A peddler bought 491 yards of cloth at 81 cents a yard: he used 29 yards, and sold the rest at 95 cents a yard: how much did he gain?

48. By selling an acre of land for \$47, I lose \$17: how much did 208 acres cost?

### ARTICLE 33.—CASE I.

- |                                      |   |
|--------------------------------------|---|
| 1. $4327 \times 35 = \text{what?}$   | 7. $646678 \times 108 = \text{what?}$   |
| 2. $89265 \times 48 = \text{what?}$  | 8. $4567891 \times 132 = \text{what?}$  |
| 3. $972654 \times 72 = \text{what?}$ | 9. $3873873 \times 144 = \text{what?}$  |
| 4. $876876 \times 84 = \text{what?}$ | 10. $6968676 \times 66 = \text{what?}$  |
| 5. $373435 \times 96 = \text{what?}$ | 11. $7234776 \times 56 = \text{what?}$  |
| 6. $698785 \times 99 = \text{what?}$ | 12. $6910725 \times 132 = \text{what?}$ |

### ARTICLE 34.—CASE II.

- |                              |                                |
|------------------------------|--------------------------------|
| 1. $4734 \times 100 = ?$     | 4. $885763 \times 100000 = ?$  |
| 2. $47080 \times 1000 = ?$   | 5. $300003 \times 100 = ?$     |
| 3. $530900 \times 10000 = ?$ | 6. $8325964 \times 100000 = ?$ |

### ARTICLE 35.—CASE III.

- |                        |                      |
|------------------------|----------------------|
| 1. Multiply 470 by 26. | 7. 909090 by 6006.   |
| 2. 327 by 600.         | 8. 8040 by 600800.   |
| 3. 580 by 70.          | 9. 703600 by 7090.   |
| 4. 9200 by 407000.     | 10. 6060 by 6060.    |
| 5. 63005 by 1240.      | 11. 846300 by 79000. |
| 6. 10008 by 10800.     | 12. 70070 by 8800.   |

## DIVISION.

## ARTICLE 45.—SHORT DIVISION.

- |                      |                      |
|----------------------|----------------------|
| 1. Divide 6532 by 3. | 14. 56464237 by 9.   |
| 2. 11236 by 9.       | 15. 46626289 by 11.  |
| 3. 57636 by 6.       | 16. 2523360 by 6.    |
| 4. 11485 by 7.       | 17. 160590736 by 8.  |
| 5. 98537 by 8.       | 18. 370370480 by 10. |
| 6. 345246 by 5.      | 19. 101650247 by 12. |
| 7. 1680245 by 4.     | 20. 51088982 by 7.   |
| 8. 3432026 by 6.     | 21. 67320837 by 9.   |
| 9. 6216563 by 8.     | 22. 30040526 by 11.  |
| 10. 7295849 by 10.   | 23. 106131923 by 12. |
| 11. 16779120 by 12.  | 24. 740048200 by 8.  |
| 12. 37000305 by 5.   | 25. 45603875 by 10.  |
| 13. 5767692 by 7.    | 26. 336384072 by 9.  |

27. What is the one-half of 472?
28. What is the one-fourth of 9996?
29. What is the one-sixth of 7116?
30. What is the one-seventh of 111111?
31. What is the one-fifth of 98765?
32. What is the one-eighth of 6849360?
33. What is the one-ninth of 4367421?
34. What is the one-tenth of 3742690?
35. What is the one-ninth of 7845734?
36. What is the one-eleventh of 54665545?

## ARTICLE 46.—LONG DIVISION.

- |                       |                     |
|-----------------------|---------------------|
| 1. Divide 8734 by 13. | 5. 31516420 by 52.  |
| 2. 5748435 by 21.     | 6. 40421916 by 81.  |
| 3. 6480752 by 32.     | 7. 215045924 by 43. |
| 4. 7254231 by 41.     | 8. 391665124 by 53. |

- |                      |                         |
|----------------------|-------------------------|
| 9. 562752060 by 64.  | 16. 1269871660 by 209.  |
| 10. 46291800 by 91.  | 17. 2265189959 by 311.  |
| 11. 6089999 by 35.   | 18. 4017811157 by 541.  |
| 12. 537899595 by 57. | 19. 5882255170 by 634.  |
| 13. 133895268 by 18. | 20. 4280281488 by 973.  |
| 14. 295129166 by 38. | 21. 4076425960 by 623.  |
| 15. 200062444 by 29  | 22. 3522467991 by 1019. |

23. Divide 71810282755 by 7305.  
 24. Divide 33216694340 by 6635.  
 25. Divide 28956427101 by 7239.  
 26. Divide 21998981374 by 3827.  
 27. Divide 16518324782 by 5943.  
 28. Divide 472698568233 by 73421.  
 29. Divide 1172481547818 by 85043.

30. How many hats, at \$5 each, can be bought for \$2370?

31. If a man earn \$13 a week, how many weeks must he work to earn \$2093?

32. If 75 men earn \$3375, how much will each receive?

33. How many bushels of 61 pounds each, are there in 18727 pounds of wheat?

34. If a boat go 272 miles per day, in how many days can it go 18768 miles?

35. How many shares of \$25 each, are there in a steamer worth \$39275?

36. If a cubic foot of wall require 21 bricks, how many cubic feet will 8988 bricks make?

37. If an acre produce 53 bushels of corn, how many acres will be required for 7791 bushels?

38. If 313 horses are sold for \$45385, how much apiece do they bring?

39. How many bales of 427 pounds each, in 468419 pounds of cotton?

40. How many cannon balls, each weighing 68 pounds, can be cast from 17340 pounds of iron?

41. How many casks containing 126 gallons each, can be filled from a tank containing 49140 gallons?

42. Divide one billion by 256.

## CONTRACTIONS IN DIVISION.

### ARTICLE 47.—CASE I.

- |                       |                     |
|-----------------------|---------------------|
| 1. Divide 5200 by 15. | 8. 6119432 by 88.   |
| 2. 158550 by 25.      | 9. 8061309 by 108.  |
| 3. 316736 by 32.      | 10. 4802112 by 56.  |
| 4. 768493 by 44.      | 11. 3770998 by 77.  |
| 5. 4173504 by 84.     | 12. 25536280 by 55. |
| 6. 4663316 by 49.     | 13. 25891535 by 45. |
| 7. 1954845 by 54.     | 14. 67961331 by 99. |

### ARTICLE 48.—CASE II.

1. Divide 8738 by 10.
2. Divide 374308 by 100.
3. Divide 6780009 by 1000.
4. Divide 674824200 by 10000.
5. Divide 9378099803 by 100000.
6. Divide 600000307 by 10000.
7. Divide 605837007 by 1000.
8. Divide 600067000017 by 1000000.
9. Divide 8436700 by 10.
10. Divide 932847021 by 1000.
11. Divide 99884288021 by 100000.

### ARTICLE 49.—CASE III.

1. Divide 131111 by 400.
2. Divide 5170390 by 9200.

3. Divide 42851200 by 7070.
4. Divide 60875000 by 6250.
5. Divide 364630766 by 79300.
6. Divide 50875007 by 7400.
7. Divide 33052800 by 7040.
8. Divide 252000710 by 7290.
9. Divide 341213701 by 95100.
10. Divide 64263477 by 8050.
11. Divide 19315401 by 6460.
12. Divide 696850888 by 99000.
13. Divide 264373200 by 80700.
14. Divide 648240509 by 92500.
15. Divide 3157341000 by 723000.
16. Divide 4505988200 by 70660.
17. Divide 4729054325 by 584700.
18. Divide 782291919288 by 8880800.

#### ARTICLE 56.—PROMISCUOUS EXAMPLES.

1. A man bought 47 acres of land: for 25 acres he paid \$41 an acre, for the rest \$45 an acre: how much did all cost?

2. What number, multiplied by 327, will give for product 236421?

3. A had 75 cows, B 90: each sold his for \$2250: how much per head did A receive more than B?

4. What number divided by 23, will give for quotient one-seventh of 343?

5. When a man's estate was divided, his widow received \$5148, and the rest was portioned among 11 children, giving each \$936: what was the estate worth?

6. Find a number, to which, if 347 be added, the sum will be 347 less than 1000.

7. A product was 158598, and the multiplicand 594: find the multiplier.



8. Of what number is 158 both divisor and quotient?
9. Four men owned 3128 acres, of which 1003 acres belonged to the first, 939 acres to the second, and 721 to the third: how much had the fourth?
10. By what must one-half of 336 be multiplied to make one-fifth of 21000?
11. A man owns 47 acres of woodland worth \$38 an acre, and 65 acres of cleared land worth \$52 an acre: how much are both worth?
12. A city had \$311205 at the beginning of the year: the income of the year was \$884743, and the expenses \$896756: what was the balance on hand at the end of the year?
13. A man has 13 piles of wood, each containing 25 cords, and each cord 128 cubic feet: how many cubic feet has he?
14. How many days will it take a man to build 17 walls of 154 feet each, if he build 22 feet a day?
15. Which is worth more, 27 lots at \$1125 each, or 205 horses at \$140 each, and how much?
16. Bought 16 pieces of calico of 33 yards each, at 10 cents a yard, and paid with tea at 80 cents a pound: how much tea was required?
17. Bought some books for 357 cents, and sold them at 20 cents apiece, losing 17 cents: how many books were there?
18. Divide the product of 204 and 238, by their difference.
19. If 27 men receive \$3888 for 16 weeks' work, how much a week was that for each man?
20. If 59 books cost me 4307 cents, for how much must I sell 23 of them, to gain 183 cents on those sold?
21. If 36 men can grade a road in 77 days, how many men must be employed to do the same in 21 days?

22. What number must be multiplied by 37, to make the product equal to the sum of 1998 and 3996?

23. Bought 312 barrels of flour at \$5 a barrel, and sold it for \$2496: how much was gained on each barrel?

24. By selling 31 acres for \$3100, I lose \$155: for what should I sell 16 acres to gain \$597?

25. Divide the sum of 1692 and 1786, by their difference.

26. A man exchanged 159 cords of wood at \$5 a cord, for a horse valued at \$144, and the balance in sheep at \$3 apiece: how many sheep did he receive?

27. A traded with B, giving 305 shares of bank stock at \$45 a share, and receiving 77 railroad bonds at \$181 each: which owes the other, and how much?

28. Divide the product of 9976 and 2334, by the quotient of 19450 divided by 50.

29. What number exceeds 117, as much as one-half of 170 exceeds one-third of 171?

30. If the doors of 6 houses cost 17550 cents, what is the cost of a door, there being 9 in each house?

#### ARTICLE 61<sup>b</sup>.—CANCELLATION.

1. How often is 8 times 15 contained in  $12 \times 30$ ?

2. How many boxes of soap, containing 40 bars each, can be filled from 16 piles of 75 bars each?

3.  $33 \times 24 \times 35$  divided by  $18 \times 14 \times 22$  = what?

4.  $21 \times 72 \times 81$  divided by  $12 \times 27 \times 18$  = what?

5.  $45 \times 49 \times 64$  divided by  $14 \times 40 \times 36$  = what?

6. 500 bales cotton weighing 400 pounds each, at 6 cents a pound, were exchanged for nails at 5 cents a pound: how many kegs of 100 pounds each were given?

7. Divide the product of 72, 74, 84, and 94 by the product of 27, 37, 47, and 7.

## FEDERAL OR UNITED STATES MONEY.

## ARTICLE 67.—NUMERATION.

*Let the Pupil read the following:*

\$20.19	\$138.70 1	\$43.38 1	\$92.90 8
\$4.04 8	\$25.02 5	\$100.00 8	\$600.40
\$10.00 1	\$80.80	\$70.89	\$371.37 1
\$35.28 4	\$80.08 0	\$29.03 8	\$37.48
\$37.01 2	\$705.70 5	\$690.52	\$874.00 6

## ARTICLE 68.—NOTATION.

*Write in figures the following:*

1. Ninety dollars, eighteen cents.
2. Twelve dollars, twenty cents, five mills.
3. Two hundred dollars, nine mills.
4. Fifty dollars, two cents, one mill.
5. One thousand dollars, six mills.
6. Five thousand dollars, seven mills.
7. Seven hundred and eighty-seven dollars, ninety-three cents, seven mills.
8. Three thousand and five dollars, two cents.
9. Fourteen thousand dollars, two mills.

## ARTICLE 71.—REDUCTION OF U. S. MONEY.

1. Reduce 27 dollars to cents.
2. Reduce 400 cents to dollars.
3. Reduce \$34 to mills.
4. Reduce 45000 mills to dollars.
5. Reduce \$80 and 20 cents to cents.
6. Reduce 407 dimes to mills.
7. Reduce 602 cents to dollars.
8. Reduce 37500 mills to dollars.

9. Reduce \$475 and 1 cent to mills.
10. Reduce 48 cents to mills.
11. Reduce 50080 mills to dollars.
12. Reduce \$45 to cents.
13. Reduce 15010 mills to cents.
14. Reduce 45 dimes to cents.
15. Reduce 3456 cents to dollars.
16. Reduce \$34765 to mills.
17. Reduce 3314 mills to dollars.
18. Reduce 42770 mills to cents.
19. Reduce \$492 and 3 cents to mills.
20. Reduce 78910 mills to dollars.
21. Reduce \$44 and 44 cents to mills.
22. Reduce \$9846 to mills.
23. Reduce 370004 mills to dollars.
24. Reduce 70085 cents to dollars.

#### ARTICLE 72.—ADDITION OF U. S. MONEY.

1. Find the sum of \$88.88, \$99.99, \$90.09, \$7.70, \$17.90, \$183.84, and \$611.12.

2.  $\$40.19 + \$78.51 + \$90.84 + \$112.79 + \$29.08 + \$5.18 + \$929.03 + \$33.33 = \text{what?}$

3. Add \$92.03 9, \$29.09 3, \$48, \$23.75 8, \$73.48, \$5, \$218.40 6, and \$38.05.

4. Add 26 dollars, 3 cents; 50 dollars, 90 cents; 49 dollars, 1 cent; 108 dollars, 14 cents; 77 dollars, 25 cents; 83 dollars, 68 cents; and 40 dollars, 8 cents.

5. A man owes A, \$27.18; B, \$56.43; C, \$8.94; D, \$45.73; E, \$108.99; F, \$62.86; and G, \$5.09: how much does he owe in all?

6. Add 83 dollars, 7 cents, 2 mills; 34 dollars, 39 cents, 5 mills; 58 dollars, 62 cents; 76 dollars, 9 cents, 4 mills; 16 dollars, 92 cents, 7 mills; 65 dollars, 60 cents, 4 mills; 23 dollars, 90 cents, and 8 mills; and 15 dollars.

7. Bought a farm for \$3273.08; a house for \$1503.91; 3 horses for \$429.17; cows for \$273.54; sheep for \$290.09; hogs for \$147.26; and furniture for \$298.98: what was the total amount?

8. After lending one man 60 dollars; another 139 dollars, 44 cents; a third 56 dollars, 73 cents; a fourth 78 dollars and 17 cents; a fifth \$93.39; and a sixth \$45.09, I had left \$357.28: what sum had I at first?

### ARTICLE 73.—SUBTRACTION OF U. S. MONEY.

1. From \$98.13 7 take \$39.27 4.

2. From \$40 take \$20.20 2.

3. From 77 dollars, 5 cents, take \$49.81.

4. \$1000 — \$102.32 5 = what?

5. From \$600.01 take \$174.84 4.

6. From seven hundred dollars and six cents, subtract \$223.40 2.

7. \$593.15 — \$208.28 = what?

8. From one thousand dollars, subtract forty-seven dollars, ninety cents, nine mills.

9. Having \$503.01, I paid a debt of \$267.08: how much had I then?

10. How much change must a man receive from a one-hundred dollar bill, after buying goods to the amount of \$67.43?

11. From nine hundred and three dollars and twenty cents, subtract \$705.82.

12. A is worth \$19327.30; B, \$29120.91: what is the difference in their wealth?

### ARTICLE 74.—MULTIPLICATION OF U. S. MONEY.

1. Multiply \$27.57 5 by 8.

2. Multiply \$319.43 by 9.

3. Multiply \$8.24 5 by 10.



4. Multiply \$905.20 by 35.
5. Multiply \$9.00 9 by 112.
6. Multiply \$5, 9 ct. by 23.
7. Multiply \$673.34 by 227.
8. Multiply \$3, 3 mills by 274.
9. Multiply \$98, 1 ct., 1 mill by 120.
10. Multiply \$14, 3 ct., 4 mills by 500.
11. Multiply \$3456.78 9 by 125.
12. Multiply 37 ct., 5 mills by 648.
13. What cost 41 barrels of eggs, at six dollars and twenty-five cents a barrel?
14. What cost 327 acres of land, at twenty-seven dollars, three cents an acre?
15. At 32 ct. a pound, what will 391 pounds of tea cost?
16. What will the grading of 880 feet of road cost, at \$2.05 a foot?
17. Find the cost of 28 weeks' board, at 4 dollars, 87 cents, 5 mills a week.
18. Find the cost of 13 sacks of potatoes, each containing three bushels, at 73 ct. a bushel.
19. What cost 2192 yards of muslin, at 9 ct. a yard?
20. What cost 5 hogsheads of tobacco, each weighing 560 pounds, at 28 ct. a pound?
21. What will 50 men receive for 2 days' work of 9 hours each, at the rate of 15 ct. an hour for each?
22. A merchant sold 3725 gallons of wine, gaining 42 ct. on each gallon: find the total gain.
23. What cost the uniforms for 14 companies of 90 men each, at \$41.25 per uniform?
24. A merchant received from Europe 10 boxes of cloth, each containing 27 pieces of 33 yards each: what was the value of the whole, at \$2.90 a yard?

## ARTICLE 75.—DIVISION OF U. S. MONEY.

- |                          |                        |
|--------------------------|------------------------|
| 1. Divide \$204.30 by 6. | 4. \$12601. by 125.    |
| 2. \$719.99 2 by 8.      | 5. \$1013.23 2 by 304. |
| 3. \$13.92 by 96.        | 6. \$2850.38 by 95.    |

7. Divide \$53.90 by 17 ct. 5 m.

8. Divide \$4408.01 7 by \$39.00 9.

9. Divide \$20432.30 by \$40.46.

10. Divide \$326.50 by \$1.30 6.

11. Divide \$260167.68 by \$75.28.

12. Divide \$9009.98 1 by 99 ct. 9 m.

13. At 43 ct. a pound, how many pounds of wool can be bought for \$903?

14. If 49 acres of land cost \$162.30, what is that per acre?

15. If 96 window shades are sold for \$204, how much is that apiece?

16. A man earns \$306 in 200 days: required his daily wages.

17. If 3780 pounds of rice were sold for \$207.90, how much was that per pound?

18. If 919 sheep were sold for \$2000, how much was that apiece?

19. Two bales of 620 pounds each, were sold for \$93: how much was that a pound?

20. A tobacconist wishes to sell 15 boxes of tobacco for \$378: if it is worth 24 ct. a pound, how many pounds must he put in each box?

21. Bought 20 boxes of raisins, each containing 22 pounds, for \$66: find the cost per pound.

22. How many pieces of muslin, each containing 33 yards, must be sold at 14 ct. 5 m. a yard, to realize \$1339.80?

23. A man sold 13 tierces of wine, at \$2.60 a gallon, and received \$1419.60: how many gallons were in each tierce?

ARTICLE 76.—PROMISCUOUS EXAMPLES.

1. A is worth \$19381.37; B \$2917.39 less than A: what are both together worth?

2. A man having \$379, bought 97 cords of wood at \$2.95 a cord: how much had he left?

3. I received from A \$93.86, from B \$46.31, from C \$101.88, and from D \$9.08; I then paid E \$197.58: how much had I left?

4. While earning \$80 a month, I saved \$98.35 in 5 months: what was my monthly expenditure?

5. A man sold a farm for \$1567.30, and a house for \$3121.30, and invested all in cows at \$23.80 each: how many cows did he buy?

6. A farmer sold 40 bushels of wheat at \$1.19 a bu.; another had 13 bu. more than the first, which he sold at 15 ct. less per bu.: how much more did the second receive than the first?

7. How many half-eagles must be given for 80 horses at \$102.50 each?

8. Bought 359 bushels of apples, at \$1.20 a bu., and had left \$99.80: what sum had I at first?

9. Bought 324 pounds of indigo for \$243: if I sold it for 15 ct. a pound more than I gave for it, what was my gain?

10. Sold 37 boxes of oranges at \$2.75 a box, losing \$27.30: what was the cost of all?

11. Received from A \$19.89; from B \$33.24; from C \$25.47 more than from A: how much more was received from C than from B?

## REDUCTION.

## ARTICLE 78.—DRY MEASURE.

1. Reduce 8120 pints to bushels.
2. Reduce 15 bushels to quarts.
3. Reduce 99 bu. 3 pk. 7 qt. 1 pt. to pt.
4. Reduce 1000 bu. to qt.
5. Reduce 3521 qt. to bu.
6. Reduce 915 bu. 1 pt. to pt.
7. Reduce one million pt. to bu.
8. Reduce 111111 qt. to pk.
9. Reduce 8765432 pt. to bu.
10. Reduce 32041 pt. to bu.
11. Reduce 16275 bu. to pt.

## ARTICLE 82.—TROY WEIGHT.

1. Reduce 1746 grains to ounces.
2. Reduce 5 lb. 7 pwt. to grains.
3. Reduce 38409 gr. to lb.
4. Reduce 72 lb. 5 oz. to pwt.
5. Reduce 3127 lb. to pwt.
6. Reduce 181464 gr. to lb.
7. Reduce 111 lb. 1 gr. to gr.
8. Reduce one million gr. to lb.
9. Reduce 11 lb. 11 oz. 11 gr. to gr.
10. Reduce one hundred thousand lb. to gr.
11. Reduce 10 lb. 1 oz. 10 pwt. 1 gr. to gr.
12. Reduce 69125 gr. to lb.

## ARTICLE 83.—APOTHECARIES' WEIGHT.

1. Reduce  $7\frac{2}{3}$  1  $\frac{1}{3}$  to grains.
2. Reduce 691  $\text{℥}$  to pounds.

*Test Examples.*—3

3. Reduce 11 lb 11  $\bar{3}$  11 gr. to gr.
4. Reduce eighty thousand lb to gr.
5. Reduce 75376  $\bar{3}$  to lb.
6. Reduce 17 lb 3  $\bar{3}$  13 gr. to gr.
7. Reduce 16473  $\bar{3}$  to  $\bar{3}$ .
8. Reduce 115 lb 3  $\bar{3}$  to  $\bar{3}$ .
9. Reduce 123456  $\bar{9}$  to  $\bar{3}$ .
10. Reduce 176 lb 3  $\bar{3}$  2  $\bar{9}$  to gr.
11. Reduce 47231 gr. to  $\bar{3}$ .
12. Reduce 327426  $\bar{9}$  to lb.

#### ARTICLE 84.—A VOIR DUPOIS WEIGHT.

1. Reduce 15 lb. 15 oz. 15 dr. to dr.
2. Reduce 1 T. 3 qr. 7 lb. to oz.
3. Reduce 47520 lb. to T.
4. Reduce 3 qr. 24 lb. 15 dr. to dr.
5. Reduce 8000 T. to lb.
6. Reduce 27 T. 13 lb. to dr.
7. Reduce 67 T. 1 cwt. 1 oz. to dr.
8. Reduce one million dr. to T.
9. Reduce 3 T. 17 cwt. 16 lb. to oz.
10. Reduce 1 T. 2 cwt. 3 qr. 4 lb. to oz.
11. Reduce 17 T. 15 dr. to dr.
12. Reduce 17000015 dr. to T.

#### ARTICLE 85.—LONG OR LINEAR MEASURE.

1. Reduce 11 yd. 11 in. to inches.
2. Reduce 7 yd. 1 ft. to inches.
3. Reduce 727 in. to yards.
4. Reduce 47 mi. 3 rd. to rd.
5. Reduce eight thousand mi. to rd.
6. Reduce 39250 rd. to mi.



## ARTICLE 88.—LAND OR SQUARE MEASURE.

1. Reduce 4 square miles, 1 R. to P.
2. Reduce 777777 P. to sq. mi.
3. Reduce 1000 A. to P.
4. Reduce 28 sq. mi. to R.
5. Reduce 856440 P. to A.
6. Reduce one billion sq. in. to sq. yd.

## ARTICLES 89 AND 90.

1. How many sq. yd. of canvas will be required to make a screen 6 yd. long and 4 ft. wide?
2. How many sq. yd. of paving in a street 2700 ft. long and 40 ft. wide?
3. A field is 20 rd. wide : how long must it be to contain 10 A.?
4. How many sq. ft. in a platform 40 ft. long and 13 ft. 6 in. wide?
5. How long must an avenue be made, to contain 45 A., if it is 4 rd. wide?
6. How many bu. of wheat can be raised on a farm 1 mi. wide and 2 mi. long, if each A. produces 12 bu.?

## ARTICLE 91.—SOLID OR CUBIC MEASURE.

1. Reduce 1000000 cu. in. to C.
2. Reduce 1 tn. round timber to cu. in.
3. Reduce 125 C. to tn. hewn timber.
4. Reduce 444448 cu. ft. to C.
5. Reduce 7 C. 32 cu. ft. to cu. in.
6. Reduce 3783528 cu. in. to tn. round timber.
7. How many solid yd. in an embankment 252 ft. long, 22 ft. wide, and 5 yd. high?
8. How many C. in a pile of wood 8 ft. wide, 12 ft. high, and 132 ft. long?

9. How many tn. in a pile of hewn timber 64 ft. long, 16 ft. wide, and 6 ft. 3 in. high?

10. How many in. cubes of lead could be molded from a piece 2 ft. long, 4 in. wide, and 2 in. thick?

11. How often could a box, 4 in. long, 2 in. wide, and 1 in. high, be filled from a crib 7 ft. long, 2 ft. wide, and 3 ft. high?

#### ARTICLE 94.—CLOTH MEASURE.

1. Reduce 28 yards, 2 nails to nails.
2. Reduce 90 E. En. to na.
3. Reduce 850 na. to E. Fl.
4. Reduce 70 E. Fr. 3 qr. to na.
5. Reduce 764 qr. to E. En.
6. Reduce 46 E. Fr. to yd.
7. Reduce 524 E. Fl. to yd.
8. Reduce 485 E. En. 1 qr. to E. Fl.
9. Reduce 104 E. Fr. to E. En.
10. Reduce 477 E. Fl. 1 na. to na.
11. Reduce 77 E. Fr. 1 qr. to E. Fl.
12. Reduce 6275 na. to yd.
13. Reduce 763 E. Fl. to E. Fr.

#### ARTICLE 95.—WINE OR LIQUID MEASURE.

1. Reduce 13 tierces, 1 qt. to pints.
2. Reduce 5 T. 3 hhd. 1 gal. to qt.
3. Reduce 4 p. 3 qt. to gi.
4. Reduce 100000 gi. to puncheons.
5. Reduce 7777 qt. to hhd.
6. Reduce 83 tr. 1 qt. to gi.
7. Reduce 1 T. 2 hhd. 3 gal. 1 gi. to gi.
8. Reduce 5 p. 1 pt. to gi.
9. Reduce 678910 gi. to p.

10. Reduce 345321 pt. to tierces.
11. Reduce 187 pn. to pipes.
12. Reduce 7384 pt. to puncheons.

#### ARTICLE 96.—ALE OR BEER MEASURE.

- |                        |                        |
|------------------------|------------------------|
| 1. Reduce 7 bl. to pt. | 4. 22 bl. 1 pt. to pt. |
| 2. 6321 qt. to hhd.    | 5. 1000 hhd. to qt.    |
| 3. 89105 pt. to hhd.   | 6. 77 bl. to hhd.      |

#### ARTICLE 97.—TIME MEASURE.

1. Reduce 1000000 seconds to days.
2. Reduce 2 wk. 2 hr. to seconds.
3. Reduce 756136 min. to weeks.
4. Reduce 3 wk. 1 da. to hr.
5. Reduce 2 leap yr. to min.
6. Reduce 4 common yr. to hr.

#### ARTICLE 98.—CIRCULAR MEASURE.

1. Reduce  $12^{\circ} 3' 14''$  to seconds.
2. Reduce  $1^{\circ} 2^s 4^{\circ}$  to minutes.
3. Reduce 127641" to degrees.
4. Reduce 1111111" to signs.
5. Reduce 123456789" to circles.
6. Reduce 172646' to circles.

#### ARTICLE 99.—MISCELLANEOUS TABLE.

1. Reduce 12000 sheets of paper to reams.
2. Reduce 98000000 oz. of flour to bl.
3. How many gross in one million?
4. In 23 bl. of pork, how many oz.?
5. Reduce 3 dozen gallons to gills.

## ARTICLE 100.—PROMISCUOUS EXAMPLES.

1. Reduce 12 C. 64 cu. ft. to tn. hewn timber.
2. Reduce 16321  $\mathfrak{D}$  to lb.
3. Reduce 7 hhd. 3 qt. to gi.
4. Reduce 1446 in. to yd.
5. Reduce 19 lb 4  $\mathfrak{z}$  1  $\mathfrak{D}$  to gr.
6. Reduce 137 bu. 2 qt. to pt.
7. Reduce  $47^{\circ} 5''$  to seconds.
8. Reduce 3260 na. to E. En.
9. Reduce 14 sq. yd. 3 sq. in. to sq. in.
10. Reduce 395400 gr. to lb. Troy.
11. Reduce 273425 lb. to T.
12. Reduce 8725 qt. to bu.
13. Reduce 47 E. En. 3 qr. to na.
14. Reduce 7640 rods to miles.
15. Reduce 9 p. 3 gal. to tr.
16. Reduce 11112 pt. of beer to bl.
17. Reduce 27 tn. 3 cu. ft. round timber to C.
18. Reduce 9999  $\mathfrak{D}$  to lb.
19. Reduce 9 lb. 9 oz. 9 gr. to gr.
20. Reduce 15 mi. 6 fur. 10 rd. to rd.
21. Reduce 95 lb. 9 oz. to pwt.
22. Reduce 13 wk. 5 min. to min.
23. Reduce 47 sq. mi. to roods.
24. Reduce 13 quintals of fish to oz.
25. Reduce 28 lb 3  $\mathfrak{z}$  10 gr. to gr.
26. Reduce 777 bu. to qt.
27. Reduce 360360'' to degrees.
28. Reduce 750 yd. to E. Fr.
29. Reduce 4 tn. 3 hhd. 1 gal. to qt.
30. Reduce 666624 gr. to lb. Troy.
31. Reduce 7 T. 3 cwt. 5 lb. to lb.

32. Reduce 33 mi. 33 rd. to rd.
33. Reduce 17 score and 8 to dozens.
34. Reduce 73568 dr. to cwt.
35. Reduce 8176 pt. to bu.
36. Reduce 27 bl. 27 gal. of beer to qt.
37. Reduce 1000000 P. to sq. mi.
38. Reduce 9264 gi. to puncheons.
39. Reduce 44 C. to cu. yd.
40. Reduce 56 E. Fl. 1 qr. to na.
41. Reduce 40 da. 40 min. to sec.
42. Reduce 78640 rods to miles.
43. Reduce 8888880 gr. to lb Apothecaries.
44. Reduce 44800 gi. to tuns.
45. Reduce 88 lb. 8 oz. 8 gr. to gr.
46. Reduce 1000080 sq. in. to sq. yd.
47. Reduce 30 bl. of flour to cwt.
48. Reduce 10000 lb. to gr. Troy.
49. Reduce 9024 pt. to bu.
50. Reduce 9 hhd. of beer to bl.
51. Reduce 10 C. ft. to cu. in.
52. Reduce 47 yd. 2 na. to na.
53. Reduce 27420 gr. to  $\bar{3}$ .
54. Reduce 9000 days to common years.
55. Reduce 4486 P. to A.
56. Reduce 30 lb 2  $\bar{3}$  4  $\bar{3}$  to  $\bar{9}$ .
57. Reduce 11 bu. 1 pk. 1 qt. 1 pt. to pt.
58. Reduce 64980' to circumferences.
59. Reduce 4 cwt. 1 qr. 12 lb. 8 oz. to dr.
60. Reduce 444444 gr. to lb. Troy.
61. Reduce 678312 oz. to T.
62. Reduce 71 tr. 14 gal. to pt.
63. Reduce 3599 in. to yd.
64. Reduce 66 lb 4  $\bar{3}$  to  $\bar{3}$ .



65. Reduce 48 E. Fr. 2 qr. to na.
66. Reduce 3 leap yr. 3 hr. to hr.
67. Reduce 7s 12° 5" to seconds.
68. Reduce 99 bu. 3 qt. to pt.
69. Reduce 944960 cu. in. to tn. round timber.
70. Reduce 10 lb. 10 pwt. 10 gr. to gr.
71. Reduce 8 T. 3 qr. to oz.
72. Reduce 4813 sheets to reams.
73. Reduce 9999 pt. to bu.
74. Reduce 999984 oz. to T.
75. Reduce 6468 yd. to na.
76. Reduce 2641  $\text{z}$  to lb.
77. Reduce 9365 in. to yd.
78. Reduce 111111 gr. to lb. Troy.
79. Reduce 17 cwt. 3 qr. 18 lb. 12 oz. to dr.
80. Reduce 9060 na. to E. En.
81. Reduce 1236 qt. to bu.
82. Reduce 1000000 oz. to T.
83. Reduce 10 lb 10  $\text{z}$  10 gr. to gr.
84. Reduce 8000 pt. to hhd. wine measure.
85. Reduce 8 mi. 1 fur. to rd.
86. Reduce 9000 weeks to common years.
87. Reduce 75 bu. 1 pk. 2 qt. to pt.
88. Reduce 946 qr. to E. En.
89. Reduce 2 T. 2 hhd. 1 qt. to pt.
90. Reduce 7 T. 7 lb. to dr.
91. Reduce 36000 to gross.
92. Reduce 19 hhd. 3 gal. of beer to pt.
93. Reduce 5004 pt. to bu.
94. Reduce 7 hhd. 3 gal. to puncheons.
95. Reduce 61747 gr. to  $\text{z}$ .
96. Reduce 77 E. En. 1 qr. to na.
97. Reduce 999999 sq. in. to sq. yd.

98. Reduce 75600000 seconds to days.
99. Reduce 5760000 " to circumferences.
100. Reduce 61 lb 2 Ɔ to Ɔ.
101. Reduce 1000464 cu. in. to cu. yd.
102. Reduce 16 p. 3 gal. to gills.
103. Reduce 77 yd. 7 in. to in.
104. Reduce 555552 gr. to lb. Troy.
105. Reduce 555552 oz. to T.
106. Reduce 10800 score to great gross.
107. Reduce 175 bl. 3 gal. of beer to hhd.
108. Reduce 11111 gr. to oz.
109. Reduce 5 T. 3 cwt. 3 oz. to dr.
110. Reduce 475 E. En. to E. Fl.
111. Reduce 3 sq. mi. 300 A. to roods.
112. Reduce 10 C. 100 cu. ft. 1000 cu. in. to cu. in.
113. Reduce 27 common years to weeks.
114. Reduce 30 score in. to yd.
115. Reduce 111 bu. 1 qt. 1 pt. to pt.
116. Reduce 99 yd. 2 ft. 10 in. to in.
117. Reduce 11 pn. 31 gal. 2 qt. to pt.
118. Reduce 10 lb. 10 oz. 10 pwt. to gr.
119. Reduce 777777 P. to sq. mi.
120. Reduce 777777 " to signs.

## PROMISCUOUS EXAMPLES,

## COMBINING REDUCTION WITH PREVIOUS RULES.

1. What is the cost of 3 bushels and 4 quarts of salt, at 2 cents a pint?
2. At 40 ct. per P. what cost 3 A. 1 R. of land?
3. How many powders, each containing 3 gr., can a physician make from a mixture of 1 lb calomel, 4 3 of jalap, and 2 3 of morphine?

4. If a bullet weigh 3 dr., how many could be molded from 4 lb. 8 oz. of lead?

5. A man sold a field 120 rd. long, and 64 rd. wide, at \$37.50 per A.: how much did he receive for it?

6. A farmer, dying, left 253 A. 3 R. 25 P. to be divided among his children, each of whom received 19 A. 2 R. 5 P.: how many children were there?

7. How many links, each weighing 1 oz. 4 dr., are there in a chain weighing 2 qr. 5 lb.?

8. In what time will a star move through 1 sign, at the rate of 6' 15" daily?

9. Sound moves 1142 feet per second: how long will it be in passing over 45680 yd.?

10. How many maps, 3 ft. long and 2 ft. wide, can be made from 40 sq. yd. of canvas?

11. What cost 3  $\overline{3}$  2  $\overline{9}$  of quinine, at 9 mills per gr.?

12. How many horseshoes, each weighing 8 oz., can be made from 60 lb. of iron?

13. How many cups, each weighing 8 oz., can be made from 60 lb. of silver?

14. What is the cost of 12 lb. 3 oz. of gold, at \$18.25 per oz.?

15. A man bought 3 hhd. 13 gal. of ale, at 18 ct. a gal., and sold it at 5 ct. a pt.: what was his gain?

16. A man owed \$73.10; he gave in payment 14 gal. 3 qt. of oil, worth 10 ct. a pint: how much does he still owe?

17. Bought 1 tr. of vinegar at 5 ct. a qt., and 2 bl. of beer at 5 ct. a pt.: what is the amount of the bill?

18. How many panes of glass, each 8 in. by 10 in., are in a half-box, or 50 sq. ft.?

19. What will it cost to paint one side of a fence 42 ft. long and 6 ft. high, at 50 ct. per sq. yd.?

20. If a family consume 3 lb. 8 oz. of flour daily, how long will 1 barrel last them?

21. If a mule can carry 2 cwt. 2 qr. 6 lb., how many mules will it require to carry 6 T. 8 cwt.?

22. 7 miners dug and washed 3 lb. 11 oz. of gold, worth \$18.90 an oz.: what is one man's share worth?

23. At 20 ct. a quart, how many gal. of oil can be bought for \$4?

24. If a man's income is \$1.64 every hour, what will it be in a leap year?

25. If a man spent \$3.23 a day, how much did he spend in the year 1820? in the year 1800? in 1810?

26. If an octavo book contain 16 sheets, how many leaves? how many pages?

27. A boy has 3 lb. 7 oz. of candy, which he traded for marbles, giving 11 dr. for each: how many marbles does he receive?

*What would be the cost*

28. Of 7 oz. 2 gr. of gold, at 4 ct. a grain?

29. Of 3 yd. 2 ft. of chain, at 8 ct. an inch?

30. Of 6528 cu. ft. of wood, at \$5 a cord?

31. Of 7 T. 3 qr. of wool, at 44 ct. a pound?

32. Of 7 T. 3 qt. of wine, at 44 ct. a pint?

33. Of 200 yd. of paving, at 68 ct. a linear foot?

34. If a lb. of refined gold cost \$288, how much is that per grain?

35. A family consumed a barrel of pork in 3 wk. 4 da., each person eating 8 oz. daily: how many persons in the family?

36. If a flask hold 1 qt. 1 pt., how many such flasks can be filled from 1 hhd. of wine?

37. A field of wheat cost \$26 for plowing: how much land did it contain, if each P. cost 8 mills?

38. If a man earn \$1.25 a day, in how many weeks will he earn \$76.25?

39. If a man eat 1 lb. 2 oz. daily, in how many wk. will he eat 1 cwt. 8 lb.?

40. What is the cost of 1 bl. 35 gal. 3 qt. of beer, 5 ct. a pt.?

41. If a man drink 3 pt. of beer daily, each costing 5 ct., how long will it take him to drink 2 bl. 3 qt., and what will he pay?

42. What will be the cost of paving a walk 5 ft. wide and 18 ft. long, at \$1.50 per sq. yd.?

43. The earth contains 50000000 sq. mi. of land: how many persons could live on its surface, allowing each one 16 A.?

44. I had \$27.50: after buying 3 bu. 2 qt. of cranberries, at 5 ct. a pt., how much had I left?

45. I bought a bu. of salt, a bl. of ale, and a hhd. of molasses, paying for each 8 ct. a qt.: what was the entire cost of the three?

46. How many rings, each weighing 100 gr., can be made from 10 lb. 5 oz. of gold?

47. What will an ingot of gold 8 in. long, 4 in. wide, and 1 in. thick, be worth, at 3 ct. a gr., if each cu. in. weighs 10 oz.?

48. If it require 4 yd. to make a coat, how many coats can be made from 405 E. Fl. 1 qr. of linen?

49. How long will it take a company to extend a railway 121 mi. 2 fur. 8 rd., if they build 7 fur. 28 rd. daily?

50. Find the cost of 1000000 lb. of hay, at \$36 per tun.

51. How many cards 4 in. long, and 2 in. wide, could be cut from a sq. yd. of pasteboard?

*Find the cost*

52. Of 20160 gi. of wine, at \$137.50 per tr.

53. Of 5440 rd. of road, at \$372.83 a mi.

54. Of 178560 gr. of jewels, at \$525 a lb.

55. Of 18000 matches, at 2 ct. a gross.

56. Of 78080 P. of land, at \$15.12 5 per acre.

57. Of 16384 pt. of berries, at \$3.75 a bu.



58. A man bought 20 E. Fl. of cloth, at 7 ct. a na., and sold it at \$1 a yd.: what did he lose?

59. Find the cost of 7 piles of wood, each 16 ft. long, 6 ft. high, and 4 ft. wide, at \$3.81 a C.

60. A man employed to chop wood at 80 ct. a C., earned \$48 in 5 wk.: how much did he cut daily?

## ADDITION OF COMPOUND NUMBERS.

### ARTICLE 101.

1. 3 bu. 3 pk. 3 qt.+4 bu. 5 qt. 1 pt.+7 bu. 3 pk. 1 pt.+11 bu. 3 pk. 7 qt.+6 bu. 6 qt.+3 bu. 3 pk.+9 bu. 3 pk. 6 qt.=what?

2. Add together 14 lb 7  $\frac{3}{4}$  2  $\frac{1}{2}$ , 5 lb 3  $\frac{3}{4}$  19 gr., 4 lb 10  $\frac{3}{4}$  5  $\frac{3}{4}$  13 gr., 6  $\frac{3}{4}$  2  $\frac{1}{2}$ , 7 lb 10 gr., 3  $\frac{3}{4}$  2  $\frac{1}{2}$  19 gr., and 6 lb 6  $\frac{3}{4}$  6  $\frac{3}{4}$  9 gr.

3. Add together 3 yd. 11 in., 4 yd. 2 ft., 5 yd. 2 ft. 10 in., 2 ft. 8 in., 6 yd. 1 ft. 1 in., 3 yd. 2 in., 31 yd. 10 in., and 2 ft.

4. 5 sq. yd. 3 sq. ft. 100 sq. in.+7 sq. yd. 7 sq. ft. 77 sq. in.+8 sq. yd. 8 sq. ft. 88 sq. in.+10 sq. yd. 100 sq. in.+11 sq. yd. 1 sq. ft. 11 sq. in.+6 sq. yd. 5 sq. ft. 106 sq. in.=what?

5. 3 lb. 4 oz. 13 pwt. 23 gr.+7 lb. 7 oz. 17 pwt. 17 gr.+9 lb. 9 pwt.+17 lb. 5 oz. 20 gr.+11 lb. 11 oz. 12 pwt. 12 gr.+6 oz. 6 pwt.=what?

6. 4 yd. 3 qr. 3 na.+5 yd. 3 na.+7 yd. 3 qr.+10 yd. 2 qr. 2 na.+3 qr. 3 na.+7 yd. 3 qr. 2 na.+11 yd. 3 na.=what?

7.  $19^{\circ} 9' 9''+10^{\circ} 10' 10''+19^{\circ} 19''+20^{\circ} 39'+17^{\circ} 38' 10''+27' 28''+16^{\circ} 16''+11^{\circ} 21''+17^{\circ} 17' 17''+12^{\circ} 37' 50''$ =what?

8. 2 T. 10 gal. 1 qt.+3 hhd. 62 gal.+1 T. 1 hhd. 11 gal. 1 qt.+5 T. 33 gal.+2 T. 3 hhd. 45 gal. 3 qt.+5 T. 61 gal. 3 qt.=what?

9. 2 lb 3 z 13 gr. + 2 lb 3 z 13 gr. + 4 lb 5 z 2 D + 11 z 1 z 1 D + 2 lb 1 z 1 D + 4 lb 10 z 2 z + 2 lb 2 D 4 gr. + 4 z 2 z 8 gr. + 7 z 2 D 1 gr. + 3 z 2 D 1 gr. = what?

10. 3 mi. 8 rd. + 2 mi. 7 fur. + 11 mi. 6 fur. 28 rd. + 16 mi. 7 fur. 32 rd. + 7 mi. 1 fur. + 8 mi. 1 fur. 12 rd. + 7 fur. 19 rd. + 9 mi. 21 rd. = what?

11. 4 da. 7 min. + 6 da. 5 hr. 17 sec. + 3 da. 59 min. 10 sec. + 5 da. 23 hr. 10 min. + 18 hr. 59 min. 43 sec. + 3 da. 7 sec. + 23 hr. 50 sec = what?

12. 7 cu. yd. 26 cu. ft. 1260 cu. in. + 3 cu. yd. 7 cu. ft. 27 cu. in. + 5 cu. yd. 7 cu. in. + 18 cu. yd. 18 cu. ft. 108 cu. in. + 10 cu. yd. 10 cu. ft. 100 cu. in. + 7 cu. yd. 3 cu. ft. 19 cu. in. = what?

13. 7 T. 7 cwt. 7 oz. + 17 cwt. 17 lb. + 5 cwt. 13 lb. 9 oz. + 6 T. 23 lb. 13 oz. + 13 T. 19 cwt. 24 lb. + 3 T. 21 lb. 3 oz. = what?

14. 3 hhd. 60 gal. 1 qt. + 5 hhd. 60 gal. 1 pt. + 2 hhd. 60 gal. 3 qt. + 1 hhd. 3 qt. 1 pt. + 6 hhd. 6 gal. 3 qt. + 1 hhd. 2 qt. = what?

15. A man traveled 1 yr. 40 da. 3 hr. in Asia; 2 yr. 300 da. 6 hr. in Europe; 1 yr. 90 da. in Africa; 1 yr. 280 da. 14 hr. in N. America; 360 da. 5 hr. in S. America, and 1 yr. 10 da. 20 hr. in Oceanica: how long was he engaged in traveling? (365 da. to 1 yr.)

16. Planted 10 A. 3 R. 7 P. of land with flax, 30 A. 3 R. in wheat, 25 A. 2 R. 10 P. in corn, 19 A. 30 P. in oats, 8 A. 2 R. in potatoes, and had 10 A. of orchard, and 6 A. 33 P. of pasture: how much land had I?

17. A sailed on Monday  $2^{\circ} 3' 27''$ , on Tuesday  $3^{\circ} 53'$ , on Wednesday  $59' 42''$ , on Thursday  $3^{\circ} 19' 23''$ , on Friday  $5^{\circ} 14''$ , on Saturday  $2^{\circ} 30' 30''$ , and on Sunday  $1^{\circ} 1' 44''$ : what distance was traversed in the week?

18. A farmer sold 70 bu. 2 pk. of potatoes to one man, 10 bu. 3 pk. 3 qt. to another, 27 bu. 1 pk. 5 qt. to another, 44 bu. 3 pk. to a fourth, and 29 bu. 1 pk. to a

fifth; his family used 29 bu. 3 pk., and he had remaining 10 bu. 1 pk.: what quantity had he at first?

19. A tailor cut from a piece of cloth 3 yd. 2 qr. 3 na. for a coat; 5 yd. 1 qr. for an overcoat; 1 yd. 3 qr. 3 na. for a vest; 2 yd. 3 qr. for a pair of pants; and had remaining 19 yd. 1 qr. 2 na.: how much cloth in the piece at first?

20. At a mechanics' fair, eight silver medals were given, weighing respectively 2 oz. 3 pwt. 10 gr., 3 oz. 17 pwt., 1 oz. 19 pwt. 17 gr., 3 oz. 3 pwt. 3 gr., 5 oz. 17 gr., 1 oz. 2 pwt. 3 gr., 4 oz. 10 gr., and 2 oz. 12 pwt. 12 gr.: find the weight of all.

21. A brewer sold on Monday 37 bl. 3 qt. 1 pt. of beer; on Tuesday 48 bl. 17 gal.; on Wednesday and Thursday each, 32 bl. 35 gal. 2 qt.; on Friday 72 bl. 30 gal. 1 pt.; on Saturday 26 bl. 26 gal.: how much did he sell during the week?

22. A merchant shipped 40 T. 3 qr. 20 lb. of cotton, 180 T. 3 cwt. of castings, 17 T. 17 cwt. 17 lb. of salt, 5 T. 1 qr. of furniture, 87 T. 16 cwt. 18 lb. of sugar, 13 T. 10 cwt. 3 qr. of tobacco, and 75 T. 2 qr. 20 lb. of flour: how much did he ship in all?

23. Set down 4 T. 10 cwt. 1 qr. 8 lb. 8 oz. six times, and add them.

24. Add  $10^{\circ} 53' 47''$  eight times.

## SUBTRACTION OF COMPOUND NUMBERS.

### ARTICLE 102.

1. From 13 bu. 3 qt. 1 pt. take 7 bu. 5 qt. 1 pt.
2. From 29 yd. 1 qr. 1 na. take 19 yd. 2 qr. 2 na.
3. From 14 lb. 19 pwt. take 9 lb. 3 oz. 20 gr.
4. From 4 T. 3 hhd. 20 gal. take 1 T. 40 gal. 1 qt. 1 pt.
5. From 13 bl. 13 gal. 2 qt. 1 pt. of beer, take 8 bl. 35 gal. 3 qt. 1 pt.

6. From 151 T. 12 cwt. 1 qr. 20 lb. 2 oz. 2 dr. take 62 T. 19 cwt. 3 qr. 24 lb. 15 oz. 15 dr.

7. From 3 wk. 4 da. 19 sec. take 2 wk. 5 da. 23 hr. 6 min. 20 sec.

8. From 20 sq. yd. 8 sq. ft. 100 sq. in. take 10 sq. yd. 8 sq. ft. 140 sq. in.

9. 28 cu. yd. 26 cu. ft. 1250 cu. in.—15 cu. yd. 10 cu. ft. 1628 cu. in.=what?

10. 30 E. En. 2 na.—19 E. En. 2 qr. 3 na.=what?

11.  $3\frac{3}{4}$  2  $\text{D}$  19 gr.—7  $\frac{3}{4}$  1  $\text{D}$  8 gr.=what?

12. 7 wk. 7 hr. 7 min.—7 hr. 7 min. 7 sec.=what?

13. 13 yd. 1 ft. 8 in.—4 yd. 2 ft. 10 in.=what?

14.  $91^{\circ} 16''$ — $45^{\circ} 30' 8''$ =what?

15. From a pile of wood 20 ft. long, 8 ft. high, and 8 ft. wide, enough was taken to make a pile 19 ft. long, 5 ft. high, and 4 ft. wide: how much remained?

16. A railroad was projected 237 mi. 3 fur. 3 rd., and 127 mi. 7 fur. 30 rd. are finished: how much remains to be completed?

17. From a vat containing 70 bl. 3 qt. of beer, there were sold 33 bl. 34 gal. 1 pt.: how much remains?

18. A druggist mixed 1 lb  $3\frac{3}{4}$  1  $\text{D}$  of medicine, and having spilled some, found the balance weighed 11  $\frac{3}{4}$  7  $\frac{3}{4}$  2  $\text{D}$  10 gr.: how much had been spilled?

19. A man having 87 bu. 3 qt. of wheat, sold all except 17 bu. 3 pk. 1 pt.: how much did he sell?

20. A man was 27 yr. 2 mon. 10 da. older than his son: when the father was 40 yr. old, how old was the son?

21. A steamboat laden with 600 T. 3 qr. was sunk, and 350 T. 3 qr. 18 lb. of the freight was saved: how much was lost?

22. A merchant having on hand 20 hhd. 20 gal. 3 qt. of wine, receives an order for 40 hhd.: how much does he need to fill the order?

23. A goblet weighing 1 lb. 3 oz. 7 pwt. 12 gr. contains 11 oz. 11 pwt. 21 gr. of pure gold: how much alloy was there?

24. From 7 lb 4  $\frac{3}{4}$  1  $\frac{1}{2}$  10 gr. subtract 1 lb 4  $\frac{3}{4}$  2  $\frac{1}{2}$  15 gr. four times.

25. Find the time from Washington's birthday (Feb. 22, 1732,) to May 1st, 1861.

26. How old was Washington at the time of his death (Dec. 14th, 1799)?

27. The north latitude of one place is  $41^{\circ} 23' 12''$ ; of another,  $60^{\circ} 5' 2''$ : find the difference of latitude.

28. From 80 bl. of flour, 38 bl. 90 lb. were sold: how much remained?

29. If from 15 bu. 3 pk. you subtract the sum of 1 bu. 1 pk. 1 qt. and 7 bu. 2 pk. 1 qt. 1 pt., what will remain?

30. From a farm 100 rd. long and 85 rd. wide, a field was separated 71 rd. long and 31 rd. wide: what was the area of the part remaining?

## MULTIPLICATION OF COMPOUND NUMBERS.

### ARTICLE 104.

1.  $27^{\circ} 36' 48''$  multiplied by 7 = what?
2. 10 lb. 10 oz. 10 pwt. 10 gr.  $\times 10$  = what?
3. 2 T. 60 gal. 1 pt.  $\times 11$  = what?
4. 3 wk. 3 da. 13 hr. 23 min. 33 sec.  $\times 9$  = what?
5. 3 sq. yd. 8 sq. ft. 100 sq. in.  $\times 4$  = what?
6. 4 yd. 3 qr. 2 na.  $\times 11$  = what?
7. 4 yd. 2 ft. 8 in.  $\times 27$  = what?
8. 2 cu. yd. 20 cu. ft. 1220 cu. in.  $\times 30$  = what?
9. 3 tr. 37 gal. 2 qt. 1 pt.  $\times 50$  = what?
10. 19 cwt. 3 qr. 24 lb. 15 oz.  $\times 32$  = what?
11. 5 da. 50 min. 55 sec.  $\times 60$  = what?
12. 3 bu. 7 qt. 1 pt.  $\times 80$  = what?

*Test Examples.—4*



13. 2 lb 7  $\frac{3}{4}$  2  $\frac{3}{4}$  5 gr.  $\times 36 =$  what?
14. 5 hhd. 50 gal. 1 pt. of beer  $\times 71 =$  what?
15. If a heavenly body move through  $59^{\circ} 22''$  daily, how far will it go in June?
16. A steamboat travels at the rate of 12 mi. 3 fur. 20 rd. per hour: how far will it go in a day?
17. A physician compounds 47 packages of medicine, each weighing 2  $\frac{3}{4}$  2  $\frac{3}{4}$  19 gr.: what was the weight of the entire amount?
18. A merchant imported from France 56 packages of silk, each containing 33 E. Fr. 4 qr. 2 na.: find the total quantity.
19. An agent sells 80 lots, of 1 R. 20 P. each: what was the entire area?
20. If the castings for a mill weigh 1 T. 4 cwt. 3 qr. 5 lb., what will the castings for 100 mills weigh?
21. If a silver medal weigh 3 oz. 10 pt. 12 gr., what will 80 medals weigh?
22. What will 100 dozen papers of pepper weigh, each paper containing 1 oz. 8 dr.?
23. 1 bu. 1 pk. 1 qt. 1 pt.  $\times 1000 =$  what?
24. If a piece of pork weigh 5 lb. 12 oz., how many bl. can be filled with 800 pieces?

## DIVISION OF COMPOUND NUMBERS.

### ARTICLE 106.

1. Divide 27 yards, 3 nails by 5.
2. Divide 100 A. 1 R. 4 P. by 7.
3. Divide 37 hhd. 3 gal. of beer by 6.
4. Divide 43 lb. 7 pwt. 16 gr. by 8.
5. Divide 3 wk. 3 da. 3 hr. 4 sec. by 7.
6. Divide 81 T. 3 gal. by 8.
7. Divide  $89^{\circ} 25''$  by 7.

8. 3 T. 7 cwt. 9 lb. 6 dr.  $\div 10$  = what?
9. 111 bu. 1 pt.  $\div 7$  = what?
10. 95 cu. yd 15 cu. ft. 1200 cu. in  $\div 6$  = what?
11. 17 lb. 3 pwt. 12 gr.  $\div 12$  = what?
12. 3 lb 7  $\frac{3}{4}$  5  $\frac{3}{4}$  4 gr.  $\div 11$  = what?
13. 98 bl. 30 gal. 1 qt. 1 pt. of beer.  $\div 9$  = what?
14. 89 yd. 2 ft.  $\div 12$  = what?
15. If 27 men remove 421 T. 3 qr. 1 lb. of freight, how much should each man move?
16. A vintner sold 136 hhd. 2 qt. 3 gi. of wine equally among 31 merchants: how much did each buy?
17. A railroad 322 mi. 7 fur. 33 rd. long, was watched by 47 men: how much had each to take care of?
18. 4 lb 2  $\frac{3}{4}$  8 gr. was divided into 52 doses: what was the weight of one dose?
19. If 81 coats are made from 251 E. En. 2 na., how much will one coat contain?
20. A benevolent society divided 111 bu. 1 pk. 4 qt. of potatoes among 88 poor families: how much was that for each poor family?
21. If a heavenly body move through  $47^\circ$  in 53 days, 50 minutes, 18 seconds, how long is it in passing through one degree?
22. Divide 37 sq. mi. 1 A. 1 R. by 1000.
23. Divide 20 C. 19 cu. ft. by 1728.
24. Divide  $3^s 29^\circ 10'$  by 600.

#### ARTICLE 107.—PROMISCUOUS EXAMPLES.

1. A has 83 bu. 4 qt. of oats, B has 9 times as much: how much have both?
2. From a piece of cloth containing 37 yd. 3 qr., a portion containing 5 yd. 1 qr. 3 na. was cut, and of the remainder 11 coats were made: what did each contain?

3. From  $1\frac{3}{4}$  of quinine,  $1\frac{3}{4}$  12 gr. were taken, and the rest sold at 2 ct. a grain: what did it bring?

4. A ship in  $80^{\circ} 30' 30''$  west longitude, sailed east  $20^{\circ} 40''$ , then west  $10^{\circ} 10' 10''$ : what then was her longitude?

5. From a pile of wood 40 ft. long, 27 ft. wide, and 8 ft. high, enough was taken to make a pile 20 ft. long, 8 ft. wide, and 6 ft. high, and the balance sold at \$5 a cord: to what did it amount?

6. A man had 3 hhd. 33 gal. 3 qt. of wine: he used 60 gal., and sold the rest at 80 ct. a quart: what sum did he receive for the part sold?

7. There were 14 pigs of lead, each weighing 7 cwt. 3 qr. 21 lb. 4 oz.: if the same metal were in 13 pigs, what would be the weight of each?

8.  $1\frac{1}{2}$   $3\frac{3}{4}$   $7\frac{3}{4}$   $1\frac{1}{2}$  10 gr. is one-eighth of what?

9. A man owned a farm of 204 A.: he sold a lot 36 rd. long and 34 rd. wide, and divided the rest into 8 equal parts: how large was each?

10. From a mass of iron, 8 T. 3 cwt. 20 lb. was taken, and the remainder molded into 20 castings of 2 T. 17 cwt. 4 lb. each: find the weight of the mass at first.

11. How many kegs, each holding 6 gal. 3 qt. 1 pt. 2 gi., can be filled from 37 tr. of wine?

12. In a mass of ore weighing 43 lb. 3 oz. 10 pwt., one-third is silver, and 26 lb. 3 pwt. impurities, the rest gold: how much gold is there?

13. How many loads of wood, 3 ft. high, 8 ft. long, and 3 ft. wide, are there in 89 C. 56 cu. ft.?

14. A ship in latitude  $3^{\circ} 10'$  north, sailed south for 2 da. at the rate of  $10' 30''$  per hour: in what latitude was it then?

15. A brewer has 2 vats of beer, each capable of holding 35 bl. 35 gal. 3 qt.: one lacks 500 gal. of being full, and the other lacks 2 bl.: how much in both?

16. 6 cwt.=how many pounds Troy? (Note 1, Art. 84.)

17. How many min. in the first 6 mon. of a leap year?
18. A man raised 13 bu. 3 pk. of wheat on each of 18 A., and 40 bu. 4 qt. of corn on each of 50 A.: he sold 2222 bu. of grain: how much had he left?
19. An apothecary divided a quantity of medicine into 18 portions of  $1\frac{3}{4}$  12 gr. each: it should have been divided into 8 parts: how much was it intended each part should weigh?
20. A man traveled 33 mi. 3 fur. on Monday; on Tuesday 3 mi. 5 fur. 30 rods more than on Monday; on Wednesday 7 fur. less than on Tuesday: how far did he go in the three days?
21. At noon on Thursday, a ship was in north latitude  $28^{\circ} 15' 35''$ : it then sailed north till Saturday afternoon at 3 o'clock, when it was in north latitude  $41^{\circ} 34' 35''$ : what was its motion per hour?
22. A silversmith had 3 lb. 4 oz. 13 pwt. 20 gr. of silver: he reserved a portion, and of the remainder made 10 forks, each weighing 2 oz. 19 pwt. 21 gr.: how much did he reserve?
23. A liquor dealer sold to three merchants 10 hhd. 60 gal. each, to another 30 hhd. 30 gal., and had left 20 hhd. 40 gal.: what quantity had he at first?
24. A farmer raised 327 bu. 3 pk. 7 qt. of grain, of which he sold one-fifth: how much had he left?
25. A grocer had 27 bl. 33 gal. of beer: he added one-fifth as much water, and then poured the diluted beer into 36 casks: how much was there in each cask?
26. How much more must be given for 3 bl. of pork, at 9 ct. a lb., than for 9 bl. of flour, at 3 ct. a lb.?
27. What cost 3 packages of quinine containing  $2\frac{3}{4}$  12 gr. each, and 2 of morphine of  $1\frac{3}{4}$  19 gr. each, the quinine at 2 ct. a gr., and the morphine at 3 ct. a gr.?
28. A piece of gilding 2 ft. 3 in. long, and 1 ft. 8 in. wide, cost \$2.70: how much was that per sq. in.?



29. Three goblets of the same size were sold, at 40 ct. a pwt., for \$273.60: what was the weight of each?

30. What will it cost to measure a boundary line, 3 mi. 3 fur. 32 rd. long, at 5 ct. a chain? (Note, Art. 88.)

31. How far will a comet move in 3 wk. 4 da., at the rate of 7' 30" per hr.?

32. A can raise 81 bu. 3 pk. 2 qt. on 7 A.; B, 100 bu. 3 pk. on 8 A.: how much more will A raise on 17, than B on 15 A.?

33. A jeweler has gold enough to make 90 rings of 7 pwt. 18 gr. each: if he makes the rings 6 gr. lighter, how many rings can he make?

34. A father, in his will, leaves his farm of 408 A. 24 P. equally among his 9 children: if one of the children die, how much more land will each of the others receive?

35. How much will a physician gain on 1 lb 3  $\frac{3}{4}$  of medicine, costing \$2.40 an  $\frac{3}{4}$ , if he sell it at 5 ct. per dose of 6 gr.?

36. On the first of May, 1860, William was 8 yr. 4 mon. 25 da. old, and John three times as old: find John's birthday.

37. Iron is 7 times as heavy as water: if 1 cu. ft. of water weigh 1000 oz., what will be the weight of a mass of iron 8 ft. long, 1 ft. thick, and 2 ft. wide?

38. If cloth cost 20 ct. a na., what will a merchant gain by selling 17 E. Fr. 5 qr. for \$100?

39. A grocer had 2 bl. 31 gal. 3 qt. of beer, costing 8 ct. per qt.: 7 gal. leaked out: for how much must he sell the balance per qt., to gain \$5.50?

40. From 4 oz. 5 pwt. of gold, I made 12 rings, and, after giving away one, sold the others at 4 ct. a gr.: how much did I receive for them?

41. Two ships start from the same place, and sail 17' 19" each, per hr., one north, the other south: in



3 da. the latitude of the northern ship is  $48^{\circ} 17' 20''$  north: what is the latitude of the other?

42. A farmer planted 13 A. in potatoes, and raised on each rood 20 bu. 3 pk. 4 qt.: he sold 300 bu. 2 pk.: what quantity had he left?

43. I have \$4444 to invest in land: how much more can I buy at 10 ct. a P., than at 12 ct. 5 m. a P.?

44. How many cases can a man make in 365 da. of 12 hr. each, if it takes him 18 hr. 15 min. to make one?

45. If 1 cwt. of flour is worth \$3.50, what are 3 bl. worth?

46. A man bought 3 hhd. of ale: as it leaked, he was compelled to pour it into cans containing 3 gal. 3 qt. 1 pt. each: it filled 38 cans: how much had leaked out?

47. How many cu. ft. in 32 hhd. of wine? (Note, Art. 95.)

48. A person lived 7 yr. 3 mon. 25 da. in Boston, twice as long in Charlestown, 3 yr. 9 mon. 26 da. in New Orleans, and in Kansas 6 mon. 20 da. longer than in New Orleans: how long did he live in the four places?

## ARTICLE 108.—LONGITUDE AND TIME.

1. The difference of longitude between two places is  $38^{\circ}$ : what is the difference of time?

2. The difference of time between two cities is 5 hr. 37 min. 20 sec.: find the difference of longitude.

3. The difference of longitude being  $80^{\circ} 42'$ , find the difference of time.

4. The difference of time being 50 min. 50 sec., what is the difference of longitude?

5. The longitude of one place is  $17^{\circ} 20'$  east, of another  $40^{\circ} 52'$  east: what is the difference of time?

6. The longitude of one place is  $34^{\circ} 20'$  east, of another  $32^{\circ} 45'$  west: find the difference of time.

7. One place is  $37^{\circ}$  east of another: when it is 10 o'clock at the first, what is the time at the second place?

8. The longitude of Cairo is  $31^{\circ} 15' 30''$  east, of Vienna  $16^{\circ} 23'$  east: find the difference of time.

9. The longitude of Halifax is  $63^{\circ} 35' 30''$  west: find the difference of time between Cairo and Halifax.

10. The longitude of Cologne is  $6^{\circ} 58' \text{ E.}$ , of St. Louis  $90^{\circ} 15' 15'' \text{ W.}$ : find the difference of time.

11. It is 5 hr. 27 min. 58 sec. later at Canton than at Cairo: find the longitude of Canton.

12. When the time is 8 hr. A. M. at Cincinnati, where is it the same hour of the afternoon?

### ARTICLE 113.—FACTORING.

*Find the Prime Factors*

1. Of 336.	6. Of 1225.	11. Of 999.
2. Of 1470.	7. Of 1296.	12. Of 234.
3. Of 560.	8. Of 888.	13. Of 324.
4. Of 570.	9. Of 1260.	14. Of 432.
5. Of 784.	10. Of 1001.	15. Of 257.

*What Prime Factors are common*

16. To 198 and 462?	21. To 405 and 675?
17. To 420 and 588?	22. To 320 and 544?
18. To 900 and 1350?	23. To 882 and 2058?
19. To 234 and 819?	24. To 712 and 1780?
20. To 456 and 576?	25. To 1020 and 1530?

### ARTICLE 114.

*What are the several Divisors*

1. Of 63?	4. Of 45?	7. Of 98?
2. Of 54?	5. Of 36?	8. Of 110?
3. Of 50?	6. Of 70?	9. Of 114?

## GREATEST COMMON DIVISOR.

## ARTICLE 116.—FIRST METHOD.

*Find the Greatest Common Divisor*

- |                    |                           |
|--------------------|---------------------------|
| 1. Of 48 and 60.   | 10. Of 45 and 135.        |
| 2. Of 60 and 70.   | 11. Of 27 and 84.         |
| 3. Of 84 and 140.  | 12. Of 176 and 242.       |
| 4. Of 105 and 168. | 13. Of 189 and 405.       |
| 5. Of 105 and 195. | 14. Of 105 and 405.       |
| 6. Of 54 and 72.   | 15. Of 350 and 550.       |
| 7. Of 84 and 154.  | 16. Of 60, 90, and 135.   |
| 8. Of 84 and 160.  | 17. Of 125, 175, and 245. |
| 9. Of 48 and 120.  | 18. Of 54, 198, and 252.  |

## ARTICLE 117.—SECOND METHOD.

*Find the Greatest Common Divisor*

- |                   |                      |
|-------------------|----------------------|
| 1. Of 48 and 63.  | 13. Of 888 and 1443. |
| 2. 104 and 169.   | 14. 954 and 786.     |
| 3. 88 and 143.    | 15. 1222 and 1814.   |
| 4. 135 and 243.   | 16. 999 and 1147.    |
| 5. 400 and 640.   | 17. 377 and 899.     |
| 6. 625 and 784.   | 18. 187 and 319.     |
| 7. 361 and 437.   | 19. 584 and 1095.    |
| 8. 685 and 1096.  | 20. 424 and 689.     |
| 9. 960 and 1204.  | 21. 399 and 646.     |
| 10. 795 and 1105. | 22. 800 and 968.     |
| 11. 221 and 357.  | 23. 1161 and 1763.   |
| 12. 279 and 961.  | 24. 89 and 144.      |

25. Find the G. C. D. of 495, 594, and 660.
26. Find the G. C. D. of 26664, 31108, and 33330.
27. Find the G. C. D. of 1845, 2205, and 2597.
28. Find the G. C. D. of 192, 240, 288, and 320.

## LEAST COMMON MULTIPLE.

## ARTICLE 119.—FIRST METHOD.

*Find the Least Common Multiple*

- |                  |                       |
|------------------|-----------------------|
| 1. Of 8, 9, 12.  | 7. Of 12, 16, 18, 24. |
| 2. 12, 14, 21.   | 8. 32, 36, 48.        |
| 3. 48, 80, 60.   | 9. 7, 8, 28, 32.      |
| 4. 15, 25, 45.   | 10. 14, 18, 28, 24.   |
| 5. 25, 55.       | 11. 12, 96, 48, 128.  |
| 6. 6, 9, 54, 81. | 12. 36, 54, 81, 108.  |

## ARTICLE 120.—SECOND METHOD.

The twelve preceding examples may be performed by this method, together with the following additional examples:

*Find the Least Common Multiple*

1. Of 2, 4, 6, 8, 10, and 12.
2. Of 13, 21, 33, 39, and 77.
3. Of 45, 63, 80, 96, and 224.
4. Of 20, 32, 38, 40, 76, and 80.
5. Of 25, 30, 35, 40, 45, and 50.
6. Of 30, 32, 36, 40, 42, and 48.
7. Of 304 and 305.
8. Of 35, 75, 21, 15, 25, and 105.
9. Of 18, 24, 30, 36, 42, and 45.
10. Of 27, 144, 180, 216, and 252.
11. Of 63, 84, 96, 126, and 168.
12. Of 42, 60, 78, 96, 48, and 56.
13. Of 33, 44, 55, and 66.
14. Of 207, 230, and 276.
15. Of 209, 309, and 409.

## FRACTIONS.

## ARTICLE 138.—CASE I.

*Reduce the following fractions to their lowest terms:*

1. $\frac{42}{63}$ .	9. $\frac{648}{1008}$ .	17. $\frac{129}{143}$ .
2. $\frac{144}{180}$ .	10. $\frac{400}{480}$ .	18. $\frac{720}{2592}$ .
3. $\frac{120}{216}$ .	11. $\frac{462}{1540}$ .	19. $\frac{665}{1750}$ .
4. $\frac{90}{315}$ .	12. $\frac{600}{1125}$ .	20. $\frac{1215}{2025}$ .
5. $\frac{648}{720}$ .	13. $\frac{720}{2280}$ .	21. $\frac{2142}{3468}$ .
6. $\frac{27}{810}$ .	14. $\frac{588}{1848}$ .	22. $\frac{3906}{5544}$ .
7. $\frac{882}{2100}$ .	15. $\frac{108}{675}$ .	23. $\frac{3486}{5395}$ .
8. $\frac{432}{576}$ .	16. $\frac{648}{3294}$ .	24. $\frac{7337}{27347}$ .

## ARTICLE 139.—CASE II.

*Reduce the following to whole or mixed numbers:*

1. $\frac{32}{16}$ .	9. $\frac{2222}{89}$ .	17. $\frac{11925}{28}$ .
2. $\frac{400}{7}$ .	10. $\frac{3721}{43}$ .	18. $\frac{7341}{35}$ .
3. $\frac{1221}{13}$ .	11. $\frac{2345}{23}$ .	19. $\frac{4444}{23}$ .
4. $\frac{1228}{15}$ .	12. $\frac{3333}{29}$ .	20. $\frac{6285}{41}$ .
5. $\frac{778}{21}$ .	13. $\frac{7291}{27}$ .	21. $\frac{4567}{21}$ .
6. $\frac{1111}{12}$ .	14. $\frac{4321}{17}$ .	22. $\frac{8888}{37}$ .
7. $\frac{893}{47}$ .	15. $\frac{2345}{12}$ .	23. $\frac{9001}{91}$ .
8. $\frac{1240}{51}$ .	16. $\frac{4680}{45}$ .	24. $\frac{7654}{49}$ .

## ARTICLE 140.—CASE III.

*Reduce the following to improper fractions:*

1. $14\frac{9}{21}$ .	7. $28\frac{5}{1001}$ .	13. $18\frac{96}{697}$ .
2. $25\frac{3}{26}$ .	8. $43\frac{43}{143}$ .	14. $71\frac{1}{701}$ .
3. $47\frac{3}{19}$ .	9. $67\frac{1}{671}$ .	15. $213\frac{32}{323}$ .
4. $50\frac{1}{50}$ .	10. $29\frac{97}{421}$ .	16. $338\frac{1}{338}$ .
5. $49\frac{1}{51}$ .	11. $84\frac{56}{529}$ .	17. $829\frac{7}{95}$ .
6. $123\frac{7}{53}$ .	12. $61\frac{11}{445}$ .	18. $621\frac{37}{112}$ .



19.	$178\frac{1}{200}$ .	21.	$337\frac{29}{209}$ .	23.	$278\frac{278}{279}$ .
20.	$750\frac{1}{503}$ .	22.	$500\frac{47}{259}$ .	24.	$404\frac{29}{300}$ .

## ARTICLE 141.

1. Reduce 13 to a fraction whose denominator is 99.
2. Reduce 127 to eighty-sevenths.
3. Reduce 100 to a fraction whose denom. is 91.
4. Reduce 981 to eightieths.
5. Reduce 345 to a fraction whose denom. is 345.
6. Reduce 7231 to eightieths.

## ARTICLE 142.—CASE IV.

*Reduce the following to simple fractions :*

- |    |               |    |               |    |                  |    |                |    |               |    |                  |    |                  |
|----|---------------|----|---------------|----|------------------|----|----------------|----|---------------|----|------------------|----|------------------|
| 1. | $\frac{2}{3}$ | of | $\frac{5}{7}$ | of | $\frac{3}{8}$ .  | 4. | $\frac{3}{4}$  | of | $\frac{5}{8}$ | of | $\frac{12}{5}$   | of | $4\frac{4}{9}$ . |
| 2. | $\frac{7}{3}$ | of | $\frac{6}{5}$ | of | $1\frac{3}{7}$ . | 5. | $\frac{8}{11}$ | of | $\frac{5}{6}$ | of | $\frac{3}{10}$   | of | $2\frac{3}{4}$ . |
| 3. | $\frac{4}{9}$ | of | $\frac{3}{4}$ | of | $7\frac{1}{2}$ . | 6. | $\frac{4}{17}$ | of | $\frac{3}{4}$ | of | $6\frac{4}{5}$ . |    |                  |
- 
7.  $\frac{2}{3}$  of  $\frac{4}{5}$  of  $\frac{6}{7}$  of  $\frac{3}{4}$  of  $2\frac{1}{3}$ .
  8.  $\frac{3}{8}$  of  $\frac{2}{9}$  of  $\frac{5}{12}$  of  $\frac{7}{8}$  of  $20\frac{4}{7}$ .
  9.  $\frac{4}{9}$  of  $\frac{3}{7}$  of  $\frac{5}{8}$  of  $\frac{4}{5}$  of 14.
  10.  $\frac{7}{8}$  of  $\frac{9}{10}$  of  $\frac{11}{12}$  of  $\frac{8}{9}$  of  $\frac{5}{6}$  of  $20\frac{4}{7}$ .
  11.  $\frac{3}{4}$  of  $\frac{6}{7}$  of  $\frac{8}{9}$  of  $\frac{10}{11}$  of  $\frac{14}{15}$  of  $7\frac{1}{3}$ .
  12.  $\frac{5}{6}$  of  $\frac{7}{8}$  of  $\frac{4}{5}$  of  $\frac{3}{7}$  of  $29\frac{3}{5}$ .
  13.  $\frac{5}{9}$  of  $\frac{3}{10}$  of  $\frac{12}{13}$  of  $\frac{2}{3}$  of  $6\frac{1}{2}$ .
  14.  $\frac{3}{4}$  of  $\frac{2}{9}$  of  $\frac{8}{3}$  of  $\frac{5}{8}$  of  $7\frac{1}{3}$ .
  15.  $\frac{14}{15}$  of  $\frac{10}{21}$  of  $\frac{9}{16}$  of  $\frac{2}{3}$  of  $17\frac{1}{7}$ .
  16.  $\frac{17}{22}$  of  $\frac{4}{9}$  of  $\frac{11}{12}$  of  $\frac{8}{15}$  of  $3\frac{2}{5}$ .
  17.  $\frac{2}{3}$  of  $5\frac{1}{41}$  of  $\frac{31}{61}$  of  $\frac{41}{51}$  of 93.
  18.  $\frac{4}{11}$  of  $\frac{8}{7}$  of  $\frac{5}{6}$  of  $\frac{9}{10}$  of  $9\frac{5}{8}$ .
  19.  $\frac{9}{8}$  of  $\frac{19}{18}$  of  $\frac{39}{38}$  of  $\frac{16}{13}$  of  $6\frac{1}{2}$ .
  20.  $\frac{4}{5}$  of  $\frac{14}{15}$  of  $\frac{24}{35}$  of  $\frac{21}{22}$  of  $20\frac{5}{6}$ .
  21.  $\frac{22}{25}$  of  $\frac{7}{8}$  of  $\frac{8}{29}$  of  $\frac{5}{11}$  of  $1\frac{3}{7}$ .
  22.  $\frac{27}{49}$  of  $\frac{8}{5}$  of  $\frac{7}{36}$  of  $\frac{7}{9}$  of  $3\frac{3}{4}$ .

$$23. \quad \frac{9}{16} \text{ of } \frac{29}{35} \text{ of } \frac{12}{29} \text{ of } \frac{29}{36} \text{ of } 7\frac{1}{4}.$$

$$24. \quad \frac{4}{7} \text{ of } \frac{46}{63} \text{ of } \frac{49}{16} \text{ of } \frac{14}{23} \text{ of } 881.$$

## ARTICLE 144.—CASE V.

*Reduce the following to common denominators:*

$$1. \quad \frac{2}{3}, \frac{3}{4}, \frac{2}{7}.$$

$$2. \quad \frac{1}{2}, \frac{2}{5}, \frac{3}{7}, \frac{2}{9}.$$

$$3. \quad \frac{2}{5}, \frac{5}{6}, \frac{2}{3} \text{ of } 1\frac{2}{7}.$$

$$4. \quad \frac{1}{5} \text{ of } \frac{1}{4}, \frac{2}{3} \text{ of } \frac{1}{10}.$$

$$5. \quad 4, 4\frac{1}{2}, \frac{1}{9}, 1\frac{1}{5}.$$

$$6. \quad 3\frac{1}{3}, 2\frac{1}{2}, 4\frac{1}{4}, 5\frac{1}{5}.$$

$$7. \quad \frac{2}{9}, \frac{3}{4}, \frac{5}{5} \text{ of } 2\frac{2}{3}.$$

$$8. \quad \frac{2}{3}, \frac{3}{5}, \frac{5}{7}, \frac{7}{8}.$$

$$9. \quad \frac{2}{3}, \frac{4}{7}, \frac{7}{10}, \frac{10}{11}.$$

$$10. \quad \frac{2}{5} \text{ of } 3\frac{1}{3}, \frac{5}{6} \text{ of } 3\frac{1}{3}, \frac{3}{4} \text{ of } 3\frac{1}{3}.$$

$$11. \quad \frac{1}{5}, \frac{1}{6}, \frac{1}{7}, \frac{1}{8}.$$

$$12. \quad \frac{2}{5} \text{ of } 7, \frac{2}{5} \text{ of } 7\frac{1}{2}, \frac{2}{5} \text{ of } 7\frac{1}{4}.$$

$$13. \quad \frac{3}{5}, \frac{4}{7}, \frac{5}{6}, \frac{2}{9}.$$

$$14. \quad \frac{3}{8}, \frac{7}{9}, \frac{5}{11}, \frac{7}{13}.$$

## ARTICLE 146.—CASE VI.

*Reduce the following to least common denominators:*

$$1. \quad \frac{3}{4}, \frac{5}{6}, \frac{3}{8}.$$

$$2. \quad \frac{3}{8}, \frac{7}{12}, \frac{9}{16}.$$

$$3. \quad \frac{7}{9}, \frac{5}{6}, \frac{11}{12}.$$

$$4. \quad \frac{5}{8}, \frac{5}{16}, \frac{5}{12}.$$

$$5. \quad \frac{4}{9}, \frac{7}{12}, \frac{11}{24}.$$

$$6. \quad \frac{7}{16}, \frac{9}{24}, \frac{13}{32}.$$

$$7. \quad \frac{7}{6}, \frac{5}{9}, \frac{7}{12}.$$

$$8. \quad \frac{7}{18}, \frac{11}{27}, \frac{2}{9}.$$

$$9. \quad \frac{7}{12}, \frac{8}{21}, \frac{5}{14}.$$

$$10. \quad \frac{11}{18}, \frac{13}{15}, \frac{19}{30}.$$

$$11. \quad \frac{4}{9}, \frac{11}{27}, \frac{11}{12}.$$

$$12. \quad \frac{13}{15}, \frac{9}{21}, \frac{31}{35}.$$

$$13. \quad \frac{9}{14}, \frac{7}{12}, \frac{8}{21}, \frac{11}{28}.$$

$$14. \quad \frac{7}{16}, \frac{11}{24}, \frac{5}{32}, \frac{3}{4} \text{ of } 2\frac{1}{2}.$$

$$15. \quad \frac{4}{3} \text{ of } 3\frac{1}{2}, \frac{5}{8}, \frac{9}{16}, \frac{11}{28}.$$

$$16. \quad \frac{9}{16}, \frac{11}{20}, \frac{13}{24}, \frac{2}{3} \text{ of } \frac{5}{8}.$$

$$17. \quad \frac{7}{9}, \frac{9}{7}, \frac{5}{6}, \frac{11}{2} \text{ of } \frac{4}{9}.$$

$$18. \quad \frac{5}{22}, \frac{11}{14}, \frac{17}{26}, \frac{23}{77}.$$

$$19. \quad \frac{17}{18}, \frac{19}{21}, \frac{23}{24}, \text{ and } \frac{25}{27}.$$

$$20. \quad \frac{4}{5} \text{ of } \frac{4}{9} \text{ of } 1\frac{7}{8}, \frac{4}{7} \text{ of } 3\frac{1}{4}, \frac{8}{21}, \frac{19}{42}.$$

$$21. \quad \frac{5}{6} \text{ of } 3\frac{1}{5}, \frac{4}{5} \text{ of } 4\frac{1}{6}, \frac{11}{12}, \text{ and } \frac{9}{10}.$$

$$22. \quad \frac{3}{40} \text{ of } 7\frac{1}{2}, \frac{5}{9} \text{ of } 7\frac{1}{2}, \frac{3}{40}, \frac{5}{9}.$$

$$23. \quad \frac{19}{32}, \frac{39}{40}, \frac{49}{50}, \text{ and } \frac{79}{80}.$$

$$24. \quad \frac{3}{5} \text{ of } \frac{7}{11}, \frac{3}{7} \text{ of } \frac{5}{11}, \frac{2}{5} \text{ of } \frac{11}{13}, \frac{3}{7} \text{ of } \frac{13}{11}.$$

## ARTICLE 147.—ADDITION OF FRACTIONS.

1. Find the amount of  $\frac{3}{8}$ ,  $\frac{7}{10}$ ,  $\frac{1}{4}$ ,  $\frac{2}{5}$ ,  $\frac{7}{20}$ .
2. The amount of  $2\frac{1}{2}$ ,  $\frac{5}{6}$ ,  $\frac{3}{4}$  of  $\frac{7}{9}$ ,  $\frac{2}{15}$  of  $5\frac{5}{6}$ .
3. The amount of  $\frac{4}{5}$ ,  $\frac{7}{10}$ ,  $\frac{8}{15}$ ,  $\frac{9}{20}$ ,  $\frac{17}{30}$ .
4. The amount of  $18\frac{3}{4}$ ,  $\frac{3}{5}$  of  $18\frac{3}{4}$ ,  $2$ ,  $\frac{2}{3}$  of  $18\frac{3}{4}$ .
5. The amount of  $1\frac{1}{2}$ ,  $1\frac{1}{3}$ ,  $1\frac{1}{4}$ ,  $1\frac{1}{5}$ ,  $1\frac{1}{6}$ .
6. The amount of  $1\frac{1}{4}$ ,  $1\frac{1}{6}$ ,  $1\frac{1}{9}$ ,  $1\frac{1}{12}$ ,  $1\frac{1}{18}$ ,  $1\frac{1}{27}$ .
7. The amount of  $\frac{2}{7}$ ,  $\frac{4}{9}$ ,  $\frac{9}{14}$ ,  $\frac{7}{18}$ ,  $\frac{17}{21}$ ,  $\frac{2}{3}$ .
8. The amount of  $\frac{3}{4}$ ,  $\frac{5}{6}$ ,  $\frac{2}{3}$ ,  $\frac{5}{8}$ ,  $\frac{1}{2}$ ,  $1\frac{1}{6}$ .
9. The amount of  $\frac{4}{5}$ ,  $\frac{2}{3}$ ,  $\frac{7}{12}$ ,  $\frac{9}{16}$ ,  $\frac{11}{20}$ ,  $\frac{17}{24}$ .
10. The amount of  $\frac{4}{3}$ ,  $\frac{4}{5}$ ,  $\frac{4}{7}$ ,  $\frac{9}{10}$ ,  $\frac{8}{15}$ ,  $\frac{3}{14}$ .
11. The amount of  $\frac{7}{9}$ ,  $\frac{1}{4}$ ,  $\frac{5}{8}$ ,  $1\frac{1}{2}$ ,  $2\frac{3}{4}$ ,  $1\frac{5}{6}$ .
12. The amount of  $\frac{3}{4}$ ,  $1\frac{2}{3}$ ,  $\frac{4}{5}$ ,  $\frac{7}{12}$ ,  $\frac{7}{20}$ ,  $1\frac{5}{6}$ .
13. The amount of  $\frac{5}{8}$ ,  $\frac{5}{6}$ ,  $\frac{8}{9}$ ,  $1\frac{1}{2}$ ,  $\frac{11}{16}$ ,  $\frac{13}{18}$ .
14. The amount of  $\frac{6}{7}$ ,  $\frac{5}{8}$ ,  $\frac{2}{3}$ ,  $1\frac{1}{2}$ ,  $\frac{13}{14}$ ,  $\frac{9}{28}$ ,  $\frac{17}{21}$ .
15. The amount of  $6\frac{1}{2}$ ,  $6\frac{1}{3}$ ,  $6\frac{1}{4}$ ,  $6\frac{1}{6}$ ,  $6\frac{1}{12}$ ,  $6\frac{1}{8}$ .
16. The amount of  $\frac{6}{7}$  of  $\frac{8}{9}$ ,  $\frac{6}{7}$  of  $\frac{4}{5}$ ,  $5\frac{2}{3}$ .
17. The amount of  $\frac{5}{12}$ ,  $\frac{7}{18}$ ,  $\frac{17}{27}$ ,  $\frac{25}{36}$ ,  $\frac{4}{9}$ ,  $2\frac{1}{2}$ .
18. The amount of  $\frac{3}{5}$ ,  $40$ ,  $\frac{1}{10}$ ,  $\frac{8}{9}$ ,  $\frac{7}{18}$ ,  $\frac{2}{3}$ .
19. The amount of  $8\frac{1}{2}$ ,  $\frac{4}{9}$ ,  $\frac{5}{11}$ ,  $\frac{2}{3}$ ,  $\frac{5}{6}$ ,  $1\frac{5}{2}$ .
20. A boy had  $\$4$ , and earned  $\$2\frac{2}{5}$ : how much had he then?
21. A farmer sold to one person  $28\frac{3}{4}$  A., to another  $35\frac{1}{5}$  A., to another  $40\frac{7}{8}$  A., and to another  $25\frac{3}{10}$  A.: how much did he sell?
22. A spendthrift squandered  $\frac{3}{16}$  of his money the first year, and  $\frac{2}{3}$  as much the second year: what did he waste in the two years?
23. By selling goods for  $\$47\frac{3}{10}$ , I lost  $\$5\frac{9}{20}$ : what was the cost?
24. I worked for A  $3\frac{3}{4}$  da., for B  $6\frac{5}{6}$  da., for C  $8\frac{7}{8}$  da., for D  $5\frac{1}{12}$  da.: how long did I work for all?
25. From what must  $5\frac{2}{7}$  be subtracted, to leave for remainder  $9\frac{2}{3}$ ?

26. I gave away  $\$38\frac{3}{5}$ , when I had left  $\$5\frac{3}{4}$  more than I gave away: what sum had I at first?

27. Goods costing  $\$364\frac{9}{10}$ , were sold at a profit of  $\$47\frac{1}{2}$ : for how much were they sold?

28. A boy studied  $\frac{3}{32}$  of a book the first quarter,  $\frac{3}{16}$  the second quarter,  $\frac{1}{4}$  the third quarter, and  $\frac{2}{5}$  the fourth quarter: how much of it did he study during the year?

29. A man having  $\$3723\frac{4}{5}$ , paid  $\frac{1}{3}$  of it for a house, and  $\frac{2}{5}$  of it for a farm, and  $\$427\frac{1}{15}$  for horses: how much did he pay out in all?

30. Sold a team for  $\$183\frac{4}{5}$ , losing  $\$24\frac{1}{2}$ : for how much should I have sold it to gain  $\$39\frac{7}{10}$ ?

#### ARTICLE 150.—SUBTRACTION OF FRACTIONS.

- |  |   |
|--|---|
| 1. $\frac{4}{5} - \frac{1}{4} = \text{what?}$    | 6. $7\frac{3}{5} - 6\frac{3}{4} = \text{what?}$         |
| 2. $\frac{3}{8} - \frac{1}{3} = \text{what?}$    | 7. $6\frac{1}{15} - 3\frac{3}{8} = \text{what?}$        |
| 3. $4 - 2\frac{5}{7} = \text{what?}$             | 8. $150 - \frac{3}{8} = \text{what?}$                   |
| 4. $3\frac{1}{2} - 1\frac{2}{3} = \text{what?}$  | 9. $20\frac{5}{24} - 7\frac{7}{18} = \text{what?}$      |
| 5. $2\frac{3}{4} - 1\frac{7}{12} = \text{what?}$ | 10. $\frac{2}{3}$ of 17 $- 6\frac{4}{7} = \text{what?}$ |

11. From  $\frac{4}{7}$  of  $23\frac{1}{5}$  subtract  $\frac{1}{2}$  of  $16\frac{1}{7}$ .

12. From  $19\frac{7}{8}$  subtract  $15\frac{1}{12}$ .

13. From  $33\frac{1}{3}$  subtract  $16\frac{5}{6}$ .

14. From  $64\frac{2}{5}$  subtract  $30\frac{4}{7}$ .

15. From  $29\frac{1}{16}$  subtract  $19\frac{1}{18}$ .

16. From  $7\frac{7}{11}$  subtract  $5\frac{9}{13}$ .

17. From 60 subtract  $\frac{2}{3}$  of  $100\frac{1}{6}$ .

18. From  $33\frac{1}{5}$  subtract  $13\frac{2}{4}$ .

19. From  $1\frac{7}{8}$  subtract  $\frac{5}{6}$ .

20. From  $\frac{2}{7}$  of  $16\frac{1}{12}$  subtract  $3\frac{7}{16}$ .

21. From  $26\frac{5}{11}$  subtract  $10\frac{1}{8}$ .

22. From  $800\frac{7}{6}$  subtract  $95\frac{1}{4}$ .

23. From  $\frac{2}{3}$  of  $\frac{5}{6}$  of  $100\frac{1}{2}$  subtract  $44\frac{3}{8}$ .

24. From  $37\frac{1}{12}$  subtract  $17\frac{2}{3}$ .

25. If I sold a horse for  $\$191\frac{3}{10}$ , gaining  $\$43\frac{3}{4}$ , what did he cost me?

26. A man owning  $237\frac{3}{4}$  A., sold  $119\frac{1}{2}$  A.: how much had he left?

27. A person whose age is  $47\frac{5}{9}$  yr., is  $24\frac{5}{6}$  yr. older than his son: what is the son's age?

28. From a cask containing  $80\frac{3}{4}$  gal. of wine,  $25\frac{5}{9}$  gal. were drawn out: how much remained in the cask?

29. A goblet weighed  $14\frac{5}{12}$  oz., a salver  $17\frac{3}{10}$  oz.: what was the difference in weight?

30. A barrel contains  $28\frac{7}{8}$  gal. of wine: how much more would it hold?

31. There are two stations west of Cincinnati, one  $59\frac{3}{11}$  mi., the other  $80\frac{1}{7}$  mi. distant: how far from one station to the other?

32. A can do a piece of work in  $28\frac{4}{5}$  da., B in  $5\frac{5}{8}$  da. less: how long will it require B to do it?

33. A barrel of flour, after some had been used, was found to contain  $85\frac{3}{8}$  lb.: how much had been used?

34. C owns  $\frac{1}{12}$  of a cargo worth  $\$27325\frac{1}{2}$ , D owns  $\frac{5}{8}$  of an engine worth  $\$3672\frac{2}{3}$ : which is worth most, and how much more?

35. A's land was estimated at  $\$47\frac{3}{8}$  per A.; but after a panic, it brought but  $\$24\frac{3}{5}$  per A.: how much had each A. depreciated?

36. A man having  $\$343\frac{3}{4}$ , bought  $\frac{2}{3}$  of a car, worth  $\$401\frac{3}{4}$ : how much had he left?

37. There are two tanks, the first containing  $62\frac{2}{3}$  gal., the second  $49\frac{3}{5}$  gal., of beer: from the first tank a bl. was filled, and the remainder poured into the second tank: how many gal. were then in the latter?

38. A man who had  $227\frac{2}{5}$  lb. of indigo, bought  $47\frac{3}{4}$  lb., and then sold  $93\frac{1}{10}$  lb.: how many had he left?

39. From  $37\frac{1}{2}$ , subtract the difference between  $37\frac{1}{2}$  and  $45\frac{5}{9}$ .



40. A bl. of beef was  $\frac{2}{3}$  full: how many lb. would remain in it, after  $53\frac{3}{5}$  lb. were taken out?

41. A man, after buying  $7\frac{3}{3}$  bu. of corn, found he still lacked  $12\frac{3}{4}$  bu. of filling a bin which would hold 80 bu.: how many bu. had he at first?

42. A store containing a stock worth  $\$2473\frac{3}{5}$ , caught fire:  $\frac{1}{4}$  the stock was destroyed by fire;  $\$273\frac{3}{4}$  worth was stolen, and the balance, being damaged, sold for  $\frac{2}{3}$  the cost: how much did it realize?

## MULTIPLICATION OF FRACTIONS.

## ARTICLE 151.—CASE I.

- |                                    |   |                                   |
|------------------------------------|---|-----------------------------------|
| 1. $\frac{14}{15} \times 3 = ?$    | 6. $\frac{5}{8} \times 24 = ?$          | 11. $\frac{25}{39} \times 52 = ?$ |
| 2. $\frac{5}{9} \times 100 = ?$    | 7. $\frac{13}{30} \times 37 = ?$        | 12. $\frac{77}{87} \times 97 = ?$ |
| 3. $\frac{8}{11} \times 88 = ?$    | 8. $\frac{11}{27} \times 45 = ?$        | 13. $1\frac{1}{3} \times 8 = ?$   |
| 4. $\frac{19}{20} \times 18 = ?$   | 9. $\frac{49}{50} \times 27 = ?$        | 14. $3\frac{2}{5} \times 9 = ?$   |
| 5. $\frac{4}{25} \times 20 = ?$    | 10. $\frac{38}{47} \times 38 = ?$       | 15. $8\frac{4}{9} \times 11 = ?$  |
| 16. $16\frac{3}{8} \times 12 = ?$  | 20. $273\frac{5}{16} \times 601 = ?$    |                                   |
| 17. $20\frac{2}{17} \times 80 = ?$ | 21. $729\frac{41}{5} \times 240 = ?$    |                                   |
| 18. $18\frac{4}{9} \times 45 = ?$  | 22. $695\frac{3}{7} \times 800 = ?$     |                                   |
| 19. $57\frac{3}{13} \times 50 = ?$ | 23. $5680\frac{16}{11} \times 1000 = ?$ |                                   |

24. Multiply  $6009\frac{11}{18}$  by 1111.

## ARTICLE 152.—CASE II.

For Test Examples in this case, transpose the multiplicand and multiplier, in each example under the preceding case; thus,  $3 \times \frac{14}{5}$ .

*We give the following additional examples:*

- |                                   |                                       |
|-----------------------------------|---------------------------------------|
| 1. $16 \times \frac{4}{5} = ?$    | 5. $140 \times 19\frac{1}{5} = ?$     |
| 2. $100 \times \frac{11}{13} = ?$ | 6. $329 \times 29\frac{1}{7} = ?$     |
| 3. $649 \times \frac{9}{37} = ?$  | 7. $681 \times 100\frac{20}{9} = ?$   |
| 4. $700 \times \frac{29}{56} = ?$ | 8. $2473 \times 237\frac{11}{11} = ?$ |

*Test Examples.*—5

ARTICLE 153<sup>a</sup>.—CASE III.

- |   |   |
|---|---|
| 1. $\frac{4}{5} \times \frac{7}{8} = \text{what?}$                      | 8. $\frac{29}{36} \times \frac{5}{6} \times \frac{27}{58} = \text{what?}$   |
| 2. $\frac{6}{11} \times \frac{9}{22} = \text{what?}$                    | 9. $\frac{8}{9} \times \frac{5}{9} \times \frac{27}{50} = \text{what?}$     |
| 3. $\frac{12}{19} \times \frac{1}{13} = \text{what?}$                   | 10. $\frac{23}{45} \times \frac{15}{46} \times \frac{2}{13} = \text{what?}$ |
| 4. $\frac{9}{19} \times \frac{29}{45} = \text{what?}$                   | 11. $\frac{17}{10} \times \frac{80}{51} \times \frac{3}{2} = \text{what?}$  |
| 5. $\frac{6}{7} \times \frac{6}{7} = \text{what?}$                      | 12. $\frac{29}{19} \times \frac{19}{18} \times \frac{8}{17} = \text{what?}$ |
| 6. $\frac{9}{14} \times \frac{7}{18} = \text{what?}$                    | 13. $10\frac{1}{2} \times 2\frac{2}{3} = \text{what?}$                      |
| 7. $\frac{7}{11} \times \frac{2}{3} \times \frac{9}{14} = \text{what?}$ | 14. $16\frac{2}{3} \times 3\frac{1}{5} = \text{what?}$                      |

15.  $15\frac{1}{2} \times \frac{5}{6} \times \frac{17}{62} = \text{what?}$   
 16.  $7\frac{7}{9} \times 8\frac{1}{3} \times 1\frac{13}{14} = \text{what?}$   
 17.  $\frac{5}{6} \times \frac{7}{8} \times \frac{4}{9} \times \frac{10}{21} \times 2\frac{2}{5} = \text{what?}$   
 18.  $\frac{9}{14} \times 6\frac{1}{2} \times \frac{4}{3} \times \frac{15}{16} \times \frac{7}{13} \times \frac{6}{5} = \text{what?}$   
 19.  $\frac{7}{11} \times 1\frac{5}{6} \times 3\frac{3}{4} \times 28 \times \frac{2}{5}$  of  $23\frac{5}{6} = \text{what?}$   
 20.  $\frac{9}{14} \times 2\frac{1}{2} \times 3\frac{1}{9} \times 6\frac{1}{2} \times 7\frac{1}{3} = \text{what?}$   
 21.  $8\frac{1}{2} \times 8\frac{1}{3} \times 8\frac{1}{4} \times 7\frac{1}{5} \times \frac{5}{17}$  of  $\frac{8}{11} = \text{what?}$   
 22.  $1\frac{1}{2} \times 1\frac{1}{3} \times 1\frac{1}{4} \times 1\frac{1}{5} \times 1\frac{1}{6} \times 1\frac{1}{7} = \text{what?}$   
 23.  $\frac{1}{2} \times \frac{3}{4} \times \frac{5}{6} \times \frac{4}{7} \times \frac{1}{8} \times \frac{2}{9} = \text{what?}$   
 24.  $23\frac{1}{2} \times 23\frac{1}{3} \times 23\frac{1}{4} \times 23\frac{1}{5} = \text{what?}$

25. How far will a steamboat go in  $3\frac{1}{2}$  hr. at the rate of  $15\frac{2}{3}$  mi. per hour?

*What will be the cost*

26. Of  $4\frac{1}{2}$  yd. of cloth, at  $\$3\frac{3}{5}$  a yd.?  
 27. Of  $27\frac{1}{4}$  lb. of lead, at  $4\frac{4}{5}$  ct. a lb.?  
 28. Of  $5\frac{1}{5}$  A. of land, at  $\$26\frac{1}{4}$  an A.  
 29. Of  $7\frac{5}{6}$  gr. of gold, at  $4\frac{1}{2}$  ct. a gr.?  
 30. Of  $17\frac{1}{2}$  ft. of lumber, at  $2\frac{2}{7}$  ct. a ft.?  
 31. Of  $9\frac{3}{5}$  T. of hay, at  $\$23\frac{1}{3}$  a T.?  
 32. Of  $17\frac{1}{4}$  yd. of ribbon, at  $\$ \frac{2}{5}$  a yd.?

33. If it require a man  $4\frac{2}{3}$  da. to clear 1 A. of woodland, how long will he be in clearing  $8\frac{1}{4}$  A.?

34. A man having  $105\frac{3}{4}$  A. of land, exchanged  $\frac{1}{6}$  of it for wood, at the rate of  $10\frac{1}{2}$  C. per A.: how many C. did he receive?

35. A merchant has  $42\frac{3}{5}$  T. of railroad iron worth  $\$66\frac{3}{4}$  per T.: what is its total value?

36. By selling cloth at  $\$4\frac{1}{4}$  a yd.,  $\$2\frac{9}{10}$  was lost: what did  $36\frac{2}{3}$  yd. cost?

37. If 19 men can build a wall in  $23\frac{1}{4}$  da., how long would one man be in doing the same work?

38. How many square feet in an oil cloth  $7\frac{1}{2}$  ft. wide and  $20\frac{1}{3}$  ft. long?

39. What number divided by  $8\frac{5}{8}$  will give  $4\frac{3}{5}$  for a quotient?

40. What cost  $66\frac{2}{3}$  ft. of tin pipe at  $12\frac{1}{2}$  ct. a ft.?

41. Bought 21 baskets of peaches, each basket containing  $\frac{3}{4}$  bu., at  $\$2.40$  a bu.: what was the cost?

42. From  $17\frac{1}{5}$  bushels, subtract three times the sum of  $\frac{5}{6}$  and  $4\frac{1}{9}$  bushels.

43. To the product of  $8\frac{1}{3}$  and  $5\frac{1}{4}$ , add the product of  $8\frac{1}{4}$  and  $5\frac{1}{3}$ .

44. A has  $52\frac{1}{2}$  acres of land worth  $\$22\frac{2}{3}$  per A.; B has  $\frac{3}{5}$  as much, worth  $\$2\frac{1}{2}$  per A. less than A's: what is B's worth?

45. By selling  $4\frac{1}{2}$  gal. of brandy at  $\$3\frac{1}{4}$  a gal., the merchant gains  $\$2\frac{1}{8}$ : what was the cost?

## DIVISION OF FRACTIONS.

### ARTICLE 154.—CASE I.

1.  $\frac{14}{15} \div 7 = \text{what?}$

2.  $\frac{8}{9} \div 6 = \text{what?}$

3.  $\frac{16}{21} \div 7 = \text{what?}$

4.  $\frac{6}{7} \div 9 = \text{what?}$

5.  $\frac{14}{27} \div 4 = \text{what?}$

6.  $\frac{20}{19} \div 8 = \text{what?}$

7.  $\frac{14}{15} \div 5 = \text{what?}$

8.  $\frac{21}{2} \div 9 = \text{what?}$

9.  $\frac{25}{18} \div 10 = \text{what?}$

10.  $\frac{6}{7} \div 12 = \text{what?}$

11.  $14\frac{2}{3} \div 11 = \text{what?}$

12.  $92\frac{2}{5} \div 14 = \text{what?}$

- |   |  |
|---|--|
| 13. $149\frac{1}{6} \div 30 = \text{what?}$   | 16. $1437\frac{3}{4} \div 33 = \text{what?}$   |
| 14. $363\frac{2}{11} \div 47 = \text{what?}$  | 17. $8527\frac{3}{4} \div 77 = \text{what?}$   |
| 15. $1001\frac{1}{30} \div 59 = \text{what?}$ | 18. $12643\frac{2}{5} \div 147 = \text{what?}$ |

## ARTICLE 155.—CASE II.

- |  |   |
|--|---|
| 1. $17 \div \frac{3}{4} = \text{what?}$    | 10. $8 \div 1\frac{1}{2} = \text{what?}$      |
| 2. $20 \div \frac{4}{7} = \text{what?}$    | 11. $78 \div 6\frac{1}{2} = \text{what?}$     |
| 3. $29 \div \frac{9}{13} = \text{what?}$   | 12. $180 \div 8\frac{1}{16} = \text{what?}$   |
| 4. $14 \div \frac{3}{16} = \text{what?}$   | 13. $483 \div 10\frac{1}{9} = \text{what?}$   |
| 5. $100 \div \frac{19}{29} = \text{what?}$ | 14. $676 \div 12\frac{1}{14} = \text{what?}$  |
| 6. $154 \div \frac{7}{11} = \text{what?}$  | 15. $685 \div 22\frac{1}{2} = \text{what?}$   |
| 7. $77 \div \frac{3}{8} = \text{what?}$    | 16. $1000 \div 31\frac{1}{4} = \text{what?}$  |
| 8. $180 \div \frac{59}{49} = \text{what?}$ | 17. $7295 \div 37\frac{1}{2} = \text{what?}$  |
| 9. $180 \div \frac{9}{20} = \text{what?}$  | 18. $89178 \div 79\frac{1}{9} = \text{what?}$ |

## ARTICLE 156.—CASE III.

- |  |  |
|--|--|
| 1. $3\frac{1}{2} \div \frac{2}{3} = \text{what?}$            | 12. $34\frac{7}{15} \div 9\frac{2}{5} = \text{what?}$              |
| 2. $\frac{4}{5} \div \frac{1}{10} = \text{what?}$            | 13. $57\frac{3}{4} \div 3\frac{9}{11} = \text{what?}$              |
| 3. $\frac{10}{11} \div \frac{3}{2} = \text{what?}$           | 14. $38\frac{4}{7} \div 1\frac{8}{37} = \text{what?}$              |
| 4. $12\frac{4}{5} \div 1\frac{1}{7} = \text{what?}$          | 15. $14\frac{1}{4} \div \frac{6}{19} = \text{what?}$               |
| 5. $13\frac{1}{3} \div 2\frac{2}{9} = \text{what?}$          | 16. $26\frac{2}{3} \div \frac{1}{2}\frac{1}{4} = \text{what?}$     |
| 6. $30\frac{1}{4} \div 3\frac{2}{3} = \text{what?}$          | 17. $85\frac{2}{3} \div 1\frac{1}{5} = \text{what?}$               |
| 7. $15\frac{2}{3} \div 18\frac{4}{5} = \text{what?}$         | 18. $126\frac{2}{9} \div 1\frac{3}{11}\frac{1}{11} = \text{what?}$ |
| 8. $16\frac{4}{5} \div 15\frac{9}{7} = \text{what?}$         | 19. $50\frac{1}{9} \div 1\frac{1}{4}\frac{3}{2} = \text{what?}$    |
| 9. $5\frac{5}{8} \div \frac{2}{5}\frac{7}{6} = \text{what?}$ | 20. $158\frac{2}{5} \div 3\frac{2}{3} = \text{what?}$              |
| 10. $312\frac{3}{4} \div 18\frac{3}{3} = \text{what?}$       | 21. $295\frac{1}{5} \div 4\frac{2}{5} = \text{what?}$              |
| 11. $56\frac{1}{16} \div 6\frac{3}{4} = \text{what?}$        | 22. $1335\frac{5}{9} \div 17\frac{1}{3} = \text{what?}$            |

23. Divide  $5215\frac{10}{11}$  by  $46\frac{4}{11}$ .

24. Divide  $10677\frac{1}{3}$  by  $85\frac{1}{3}$ .

25. Divide  $\frac{7}{10}$  of  $2\frac{5}{6}$  by  $\frac{2}{5}$  of  $4\frac{1}{4}$ .

26. Divide  $\frac{6}{7}$  of  $\frac{4}{9}$  of  $13\frac{1}{8}$  by  $\frac{2}{3}$  of  $\frac{5}{7}$  of  $7\frac{7}{11}$ .

27. Divide  $\frac{5}{11}$  of  $\frac{3}{7}$  of  $38\frac{1}{2}$  by  $\frac{3}{4}$  of  $\frac{3}{14}$  of 8.

28. Divide  $\frac{7}{9}$  of  $\frac{4}{5}$  of  $\frac{3}{4}$  of  $\frac{5}{8}$  by  $\frac{2}{3}$  of  $\frac{2}{5}$  of  $\frac{1}{4}$ .  
 29. Divide  $\frac{1\frac{1}{2}}{1\frac{1}{2}}$  of  $\frac{7}{8}$  of  $\frac{1\frac{5}{2}}{2\frac{5}{2}}$  by  $\frac{1\frac{2}{1}}{1\frac{1}{1}}$  of  $\frac{7}{8}$  of  $4\frac{5}{11}$ .  
 30. Divide  $\frac{5}{9}$  of  $\frac{4}{3}$  of  $3\frac{3}{8}$  by  $\frac{5}{6}$  of  $\frac{1}{10}$  of  $7\frac{1}{2}$ .  
 31. Divide  $\frac{4}{11}$  of  $\frac{3}{8}$  of  $89\frac{1}{10}$  by  $\frac{3}{7}$  of  $\frac{2}{5}$  of  $6\frac{3}{4}$ .  
 32. Divide  $\frac{1\frac{2}{3}}{1\frac{2}{3}}$  of  $\frac{1\frac{4}{5}}{1\frac{4}{5}}$  of  $\frac{1\frac{6}{7}}{1\frac{6}{7}}$  by  $\frac{4}{5}$  of  $\frac{7}{13}$  of  $1\frac{8}{17}$ .

ARTICLE 158<sup>a</sup>.

*Reduce the following to simple fractions:*

1. $\frac{\frac{3}{5}}{\frac{7}{8}}$ .	7. $\frac{9\frac{5}{11}}{11\frac{5}{9}}$ .	13. $\frac{75\frac{3}{5}}{126}$ .
2. $\frac{2\frac{1}{4}}{3}$ .	8. $\frac{7\frac{3}{8}}{19\frac{2}{3}}$ .	14. $\frac{88}{88\frac{8}{9}}$ .
3. $\frac{4}{3\frac{1}{5}}$ .	9. $\frac{8\frac{4}{5}}{9\frac{1}{6}}$ .	15. $\frac{67\frac{1}{5}}{74\frac{2}{3}}$ .
4. $\frac{7\frac{1}{3}}{4\frac{8}{9}}$ .	10. $\frac{7\frac{1}{7}}{11\frac{1}{9}}$ .	16. $\frac{48}{86\frac{2}{5}}$ .
5. $\frac{6\frac{5}{7}}{7\frac{5}{6}}$ .	11. $\frac{20\frac{3}{7}}{91}$ .	17. $\frac{37\frac{1}{7}}{113\frac{3}{4}}$ .
6. $\frac{5\frac{1}{3}}{4\frac{4}{5}}$ .	12. $\frac{28\frac{1}{3}}{29\frac{3}{4}}$ .	18. $\frac{45\frac{1}{2}}{45\frac{2}{3}}$ .

ARTICLE 158<sup>b</sup>.

1. At  $\$1\frac{1}{3}$  a lb., how many pounds of feathers can be bought for  $\$7\frac{3}{4}$ ?
2. At  $\$4$  a yard, how much French broad cloth can be bought for  $\$3\frac{2}{5}$ ?
3. At  $\$5\frac{4}{5}$  per acre, how much improved prairie land can be bought for  $\$203$ ?
4. A man raised  $93\frac{3}{4}$  bu. of wheat on  $8\frac{1}{3}$  A. of land: how many bu. per acre was that?
5. At  $\$4\frac{2}{5}$  a bl., how many bl. of flour can you purchase for  $\$24\frac{3}{4}$ ?



6. At  $\$16\frac{1}{4}$  per foot, how many feet of ground can be purchased for  $\$169$ ?

7. A lot of old copper was worth  $92\frac{3}{5}$  ct., at  $19\frac{1}{4}$  ct. a lb.: how many pounds were there?

8. If a cubic foot of water weigh  $62\frac{1}{4}$  lb., what will be the bulk of a quantity of water weighing  $507\frac{1}{7}$  lb.?

9. If  $307\frac{4}{5}$  oz. of iron be made into wire, weighing  $7\frac{1}{8}$  oz. per yd., how many yd. will there be?

10. If a man can mow  $2\frac{1}{5}$  A. in a day, how long will he be in mowing  $7\frac{1}{2}$  A.?

11. At  $5\frac{1}{3}$  ct. a pound, how many pounds of sugar can be bought for 60 ct.?

12. At  $\$2$  a foot, how much molding can be bought for  $\$3\frac{2}{5}$ ?

13. In how many days will a horse eat  $329\frac{1}{3}$  pk. of oats, if he is fed  $1\frac{8}{11}$  pk. daily?

14. If an engine saws  $3\frac{1}{7}$  ft. of logs in a minute, how long will it be in sawing 10 logs, each  $8\frac{3}{4}$  ft. long?

15. What is the amount of  $\frac{6\frac{1}{4}}{5\frac{5}{6}}$  and  $\frac{\frac{3}{8}}{2\frac{1}{3}}$ ?

16. Divide the product of  $3\frac{3}{4}$  by  $3\frac{1}{3}$ , by the sum of  $2\frac{1}{2}$  and  $\frac{5}{16}$ .

17. What is the product of  $\frac{14\frac{2}{5}}{6\frac{6}{7}} \times \frac{5\frac{5}{9}}{7\frac{7}{11}}$ ?

18. Divide the product of  $6\frac{2}{3}$  and  $8\frac{8}{9}$ , by their difference.

### ARTICLE 159.

1. A man paid for digging a cellar  $\$40.12\frac{1}{2}$ ; for masonry,  $\$75.31\frac{1}{4}$ ; for brick work,  $\$329.43\frac{3}{4}$ ; for carpenters' work,  $\$247.68\frac{3}{4}$ ; for plastering,  $\$105.93\frac{3}{4}$ ; and for painting,  $\$106.25$ : what was the cost?

2. What the cost of 9 doz. brooms, at  $\$3\frac{1}{4}$  a doz.?

3. Of 44 gross of matches, at  $43\frac{3}{4}$  ct. a gross?

4. Of  $3\frac{1}{4}$  lb. of starch, at 8 ct. a lb.?

5. Of  $8\frac{1}{2}$  reams of paper, at  $\$5\frac{1}{2}$  a ream?
6. Of 7 dozen papers of needles, at  $6\frac{1}{4}$  ct. a paper?
7. Reduce 13 rods to feet.
8. Reduce 40000 yards to miles.
9. Reduce 9000000 in. to mi.
10. Reduce 23910 feet to miles.
11. Reduce  $1104\frac{1}{2}$  yards to furlongs.
12. Reduce 4 mi. 4 fur. 3 rd. to yards.
13. Reduce 1 A. 2 P. to sq. yd.
14. Reduce 4 A. to square feet.
15. Reduce 1 sq. mi. to sq. yd.
16. Reduce 16000 sq. yd. to A.
17. Reduce 15 A. 4 P. to sq. ft.
18. Reduce 130680 sq. ft. to acres.
19. Reduce  $22\frac{1}{2}$  inches to nails.
20. Reduce 3 E. Fl. 2 qr. to in.
21. Reduce 6 E. Fr. 1 na. to in.
22. Reduce 178 in. to quarters.
23. Reduce 700 gal. of water to bl.
24. Reduce 2040 pt. of vinegar to bl.
25. Reduce 3 bl. 3 gal. 3 qt. of syrup to gills.
26. Reduce 1 yr. ( $365\frac{1}{4}$  da.) to min.
27. Reduce 1200000 min. to years.
28. Reduce 144000000 sec. to years.
29. Reduce 24682464 min. to years.
30. Reduce 5 yd. 3 qr. 2 na. to inches.

## ARTICLE 160.—CASE I.

1. Reduce  $\frac{3}{5000}$  of a day to the fraction of a min.
2.  $\frac{1}{640}$  of a C. to the fraction of a cu. ft.
3.  $\frac{7}{3000}$  of a lb. to the fraction of a pwt.
4.  $\frac{2}{1089}$  of a P. to the fraction of a sq. ft.
5.  $\frac{1}{2000}$  of a bl. to the fraction of a gill.

6. Reduce  $\frac{7}{1881}$  of a rd. to the fraction of an in.
7.  $\frac{1}{12000}$  of a degree to the fraction of a second.
8.  $\frac{3}{208}$  of a yd. to the fraction of a na.
9.  $\frac{11}{18750}$  of a T. to the fraction of a lb.
10.  $\frac{7}{2232}$  of a lb to the fraction of a  $\mathfrak{D}$ .
11.  $\frac{5}{2016}$  of a hhd. of beer to the fraction of a qt.
12.  $\frac{7}{14400}$  of an oz. to the fraction of a gr.
13.  $\frac{3}{800}$  of an A. to the fraction of a P.
14.  $\frac{19}{8000}$  of a mile to the fraction of a rd.
15.  $\frac{9}{880}$  of a bu. to the fraction of a qt.

## ARTICLE 161.—CASE II.

1. Reduce  $\frac{4}{5}$  of a gr. to the fraction of a  $\mathfrak{Z}$ .
2.  $\frac{8}{9}$  of a na. to the fraction of a yd.
3.  $\frac{11}{16}$  of a ft. to the fraction of a rd.
4.  $\frac{32}{35}$  of a dr. to the fraction of a lb.
5.  $\frac{10}{9}$  of a gr. Troy to the fraction of a lb.
6.  $\frac{9}{10}$  of a second to the fraction of a degree.
7.  $\frac{8}{11}$  of a rod to the fraction of a mi.
8.  $\frac{16}{13}$  of a pt. of beer to the fraction of a hhd.
9.  $\frac{15}{16}$  of a minute to the fraction of a sign.
10.  $\frac{96}{85}$  of a qt. to the fraction of a bu.
11.  $\frac{121}{112}$  of a sq. yd. to the fraction of a R.
12.  $\frac{40}{49}$  of an oz. to the fraction of a gr.
13.  $\frac{70}{37}$  of a pt. to the fraction of a pun.
14.  $\frac{12}{7}$  of a cu. in. to the fraction of a cu. yd.

## ARTICLE 162.—CASE III.

*Find the value in integers*

- |                                  |   |
|----------------------------------|---|
| 1. Of $\frac{4}{9}$ of a degree. | 5. Of $\frac{37}{44}$ of an A.          |
| 2. Of $\frac{3}{11}$ of a mile.  | 6. Of $\frac{13}{49}$ of a bl. of wine. |
| 3. Of $\frac{5}{6}$ of an E. Fl. | 7. Of $\frac{54}{24}$ of a C. of wood.  |
| 4. Of $\frac{27}{64}$ of a bu.   | 8. Of $\frac{4}{9}$ of a rd.            |

9. Find the value of  $\frac{5}{16}$  of a bl. of beer.
10. Find the value of  $\frac{7}{15}$  of a lb Apoth.
11. Find the value of  $\frac{19}{50}$  of a P.
12. Find the value of  $\frac{5}{64}$  of a da.
13. Find the value of  $\frac{17}{256}$  of a qr.
14. Find the value of  $\frac{19}{23}$  of a T. of wine.
15. Find the value of  $\frac{14}{25}$  of a lb. Troy.

## ARTICLE 163.—CASE IV.

1. What part of 2 mi. 4 fur. is 1 mi.?
2. Of 3 hhd. 11 gal. of wine, is 12 gal. 2 qt.?
3. Of 2 lb. 4 pwt., is 3 oz. 14 pwt. 6 gr.?
4.  $51' 36''$ , of  $2^\circ 52'$ ?
5. 2 bl. 28 gal. 2 qt. of beer, of 7 bl. 16 gal.?
6. 11 A. 1 R., of 30 A. 3 R. 30 P.?
7.  $3\frac{3}{4}$  15 gr., of 3 lb  $3\frac{3}{4}$ ?
8. 4 bu. 7 qt., of 5 bu. 5 qt.?
9. 1 T. 2 cwt.  $17\frac{1}{7}$  lb., of 3 T. 4 cwt. 2 qr.  $16\frac{2}{3}$  lb.?
10.  $1^\circ 4' 21\frac{3}{4}''$ , of  $3^\circ 26' 6\frac{3}{4}''$ ?
11. 2 A. 3 R.  $30\frac{10}{17}$  P., of 3 A. 3 R.  $31\frac{11}{19}$  P.?
12. 6 cu. yd.  $\frac{6}{7}$  cu. ft., of 9 cu. yd.  $10\frac{1}{3}$  cu. ft.?
13. What part is 7 lb. 1 oz. 14 pwt.  $6\frac{6}{7}$  gr., of 13 lb. 7 oz. 12 pwt.  $17\frac{5}{11}$  gr.?
14. 2 pun. 8 gal. 3 qt.  $3\frac{1}{5}$  gi., of 7 tierces, 3 qt.?

## ARTICLE 164.

- |  |  |
|--|--|
| 1. $\frac{5}{9}$ wk.— $\frac{5}{18}$ da.=? | 4. $\frac{4}{9}^\circ - \frac{7}{8}' = ?$                        |
| 2. $\frac{7}{80}$ T.— $\frac{3}{8}$ lb.=?  | 5. $\frac{11}{12}$ rd. + $\frac{3}{4}$ yd. + $\frac{5}{6}$ ft.=? |
| 3. $\frac{4}{7}$ lb.— $\frac{8}{9}$ pwt=?  | 6. $\frac{3}{8} 3 + \frac{5}{16} 3 + \frac{3}{4} 3 = ?$          |
7.  $\frac{2}{3}$  bu. +  $\frac{2}{3}$  pk. +  $\frac{2}{3}$  qt. +  $\frac{2}{3}$  pt.=what?
  8.  $\frac{5}{14}$  hhd.— $\frac{7}{36}$  bl. of wine=what?
  9.  $\frac{5}{8}$  cu. yd.— $\frac{1}{9}$  C. of wood=what?

10.  $\frac{4}{7}^{\circ} + \frac{3}{7}' + \frac{1}{7}'' = \text{what?}$
11.  $\frac{3}{5}$  hhd. of beer  $+ \frac{4}{5}$  bl.  $+ \frac{2}{5}$  gal.  $= \text{what?}$
12.  $\frac{3}{5}$  E. Fr.  $+ \frac{5}{6}$  E. En.  $+ \frac{3}{4}$  E. Fl.  $= \text{what?}$
13.  $\frac{3}{13}$  sq. yd.  $+ \frac{5}{13}$  sq. ft.  $+ \frac{7}{13}$  sq. in.  $= \text{what?}$
14.  $\frac{3}{7}$  A.  $- 1\frac{1}{5}$  P.  $= \text{what?}$

### ARTICLE 165.—PROMISCUOUS EXAMPLES.

1. What part of  $8\frac{1}{4}$  is  $2\frac{2}{5}$ ?
2. Reduce  $147\frac{14}{3}$  to an improper fraction.
3. Reduce  $\frac{29257}{36141}$  to its lowest terms.
4. Reduce  $\frac{3}{7}$  of  $\frac{18}{25}$  of  $\frac{5}{6}$  of  $\frac{14}{15}$  of  $11\frac{1}{9}$  to a simple fraction.
5. Reduce 5 mi. 7 rd. 5 yd. 1 ft. 1 in. to in.
6.  $16\frac{33}{133} - 6\frac{67}{209} = \text{what?}$
7. Reduce  $\frac{1}{8000}$  fur. to the fraction of an inch.
8. From  $1\frac{1}{5}$  lb. subtract 4 oz.  $5\frac{3}{5}$  pwt.
9. Multiply 120 by  $16\frac{37}{45}$ .
10.  $3\frac{3}{4} + 4\frac{2}{3} + 5\frac{1}{6} + 3\frac{5}{8} = \text{what?}$
11. Divide 30 by  $\frac{3}{10}$ .
12.  $37\frac{19}{33} \times 44 = \text{what?}$
13. Reduce  $\frac{7}{11}$  sq. mi. to integers.
14.  $21\frac{1}{9} \times 31\frac{1}{29} = \text{what?}$
15. Reduce  $\frac{3}{5}$  of  $\frac{4}{9}$  of  $\frac{10}{13}$ ,  $\frac{1\frac{1}{4}}{2\frac{1}{6}}$ , and  $\frac{2}{3}$  of  $\frac{3}{6\frac{1}{2}}$  to a common denominator.
16. What number is as much greater than  $8\frac{4}{9}$ , as  $8\frac{4}{9}$  is greater than  $5\frac{2}{3}$ ?
17. By what number must  $19\frac{1}{4}$  be divided to give for quotient  $1\frac{1}{7}$ ?
18. Caps cost  $\$1\frac{3}{4}$  each, but, being damaged, they are sold at  $\frac{3}{4}$  of the cost: how many can I buy for  $\$26\frac{1}{4}$ ?
19. To the quotient of  $\frac{2}{5}$  divided by  $\frac{7}{10}$ , add  $\frac{4\frac{1}{2}}{4\frac{2}{3}}$ .



20. From  $\frac{5\frac{11}{21}}{4\frac{1}{7}}$  subtract the difference between  $7\frac{5}{6}$  and  $6\frac{7}{8}$ .

21. A man owning  $65\frac{2}{3}$  A. of land, sold  $\frac{5}{12}$  of his share for \$615 $\frac{5}{8}$ : how much was that per A.?

22. What part of a day is 13 hr. 53 min. 20 sec.?

23. A man had  $43\frac{3}{4}$  yd. of carpeting, costing \$26 $\frac{1}{4}$ : he sold  $\frac{2}{5}$  of the piece, gaining \$ $\frac{1}{4}$  on each yard sold: how much did he receive for it?

24.  $33\frac{1}{3}$ , multiplied by  $3\frac{4}{5}$ , and divided by  $6\frac{1}{3}$ , will equal what?

25.  $\frac{3\frac{2}{11}}{8\frac{3}{4}}$  multiplied by  $\frac{3}{8}$  of  $\frac{5\frac{5}{9}}{2\frac{8}{11}}$  = what?

26. A man having a farm of 90 A. 2 R.  $2\frac{1}{2}$  P., sold  $\frac{4}{7}$  of it: how much land had he left?

27. A merchant having bought 27 lb. 4 oz. of indigo, sold 11 lb. 12 oz.: what part of the whole has he left?

28. After losing \$5 $\frac{3}{5}$ , and borrowing \$18 $\frac{1}{4}$ , a man had \$35 $\frac{7}{10}$ : how much had he at first?

29. If a family consume 3 lb.  $5\frac{1}{5}$  oz. daily, how much would it require for the month of April?

30. Paid \$620 for a lot of land  $46\frac{1}{2}$  ft. long, and  $16\frac{2}{3}$  ft. wide: what was that a sq. ft.?

31. A bought  $40\frac{1}{2}$  acres of land for \$168 $\frac{3}{4}$ : at the same rate, how much must he charge for 24 acres?

32. From  $12\frac{1}{2} \times 5\frac{5}{6}$  subtract  $113\frac{1}{5} \div 1\frac{5}{7}$ .

33. Reduce  $\frac{3\frac{1}{2}}{5\frac{1}{11}}$ ,  $\frac{4\frac{1}{3}}{5\frac{1}{5}}$ ,  $\frac{7\frac{1}{3}}{6\frac{2}{7}}$ , and  $\frac{4\frac{3}{4}}{7\frac{2}{5}}$  to a common denominator.

34. What part of  $7\frac{2}{3} 2\frac{2}{7} \text{ D}$  is  $2\frac{2}{3} 1 \text{ D } 13\frac{1}{3} \text{ gr.}$ ?

35. A man bought  $23\frac{1}{3}$  A., at \$9 $\frac{1}{5}$  an A.: he sold  $15\frac{5}{6}$  A. at \$8 $\frac{4}{5}$  an A., and the remainder at \$10 $\frac{1}{3}$  an A.: did he gain or lose, and how much?

36. Multiply the product of  $6\frac{2}{3} \times 7\frac{3}{4}$ , by the quotient of  $6\frac{2}{3} \div 7\frac{3}{4}$ .

## DECIMAL FRACTIONS.

## ARTICLE 175.—DECIMAL NUMERATION.

*Examples to be copied and read by the pupil:*

.17	.87	.67819	.050403	.12345678
.06	.087	.00572	.000405	.004386
.145	.8705	.00009	.7060502	.00006742
.093	.4759	.04003	.0836497	.0000002
.007	.0857	.00506	.5000001	.002834
.708	.0006	.57003	.6006007	.6000029
.456	.0102	.58046	.008341	.70087004
.5001	.7003	.03702	.0000295	.3200004
.0604	.0001	.40375	.0050005	.00020057
.77	.334	.39256	.070604	.99099004
.5708	.0735	.05069	.083412	.470385
.987	.0084	.90603	.0001028	.47005631
.0991	.015	.07385	.0056043	.3750006
.8045	.4206	.6004	.4000096	.60000093
.6209	.0085	.6234	.305067	.56000824
.8007	.0909	.00043	.074601	.400002
.0807	.7208	.00635	.7000951	.5630041
.325	.7051	.0704	.0630204	.68000022
.0087	.9361	.700006	.0000432	.03800629

13.7	47.0025	5000000.864605
2.009	4000.004	6093.0008888
300.1	1006.001006	3562.9350707
3.072	30.00034	407.000045
100.024	38.57925	20.8000042
.124	60.248006	6055.2870004
1.0024	7011.2	.00000306
53.734	80.0056	891.20005
6.0009	108.00568	230654.3646009

## ARTICLE 176.—DECIMAL NOTATION.

Write the following:

1. Three *hundredths*: seventeen *thousandths*.
2. Thirteen units and one *hundredth*.
3. Three hundred and ninety-three *thousandths*.
4. Fifty-eight *ten-thousandths*.
5. One thousand and nine *hundred-thousandths*.
6. Seven *ten-thousandths*: eleven *millionths*.
7. 300 units and three *hundred-thousandths*.
8. Seven hundred and four *millionths*.
9. Seven hundred units and four *millionths*.
10. Nine thousand and fifty-six *millionths*.
11. Sixty units and 502784 *millionths*.
12. Six hundred thousand and four *millionths*.
13. Eight thousand and seventy-five *ten-millionths*.
14. 47 units and 1631 *ten-millionths*.
15. 60018 *millionths*: 527 *ten-millionths*.
16. Four million units and four *millionths*.
17. Thirty-seven *hundred-millionths*.
18. 3271 *hundred-thousandths*.
19. 45 units and 30703 *millionths*.
20. Four hundred and eleven *ten-thousandths*.
21. Twenty units and 261007 *billionths*.
22. 700 units and 5 *hundred-millionths*.
23. Seven hundred thousand units and one *millionth*.
24. Seven hundred thousand and one *millionths*.
25. Thirty thousand units and 46237 *billionths*.
26. 7001 units and 7001 *ten-millionths*.
27. 7236789 units and 30043 *millionths*.
28. 15 units and 77 *ten-billionths*.
29. Six million and seventy-four *billionths*.
30. Three thousand two hundred units and forty thousand and eighty-one *hundred-millionths*.

## ARTICLE 178.—ADDITION OF DECIMALS.

1. Add 27.045; 4.91; 90.2193; 7.7.
2.  $976.5 + 97.65 + 9.765 + .0009 + 50. + 72.108 + 68.037 + 40.05 = \text{what?}$
3.  $93.9975 + 372.05 + 4671.3 + 4.6715 + 33.8 + 40.004 + 783.4 = \text{what?}$
4.  $14.6 + 5.008 + .3209 + 409.6 + 27.07 + 7.872 + 62.27 = \text{what?}$
5. Add 600.0208; 539.074; 78.7006; 3.2084; .297; 99.99, and 20.0431.
6. Add 89.43; 7.3004; 60.05; 56.047; 400.96; .075; 32.095, and 18.
7.  $6.327 + 75.9 + 847.09 + 32.653 + 45.67 + .008 + 98.765 + 5.008 = \text{what?}$
8. Add 29 and 13 thousandths; 100 and 138 ten-thousandths; 57 and 4 hundredths; 95 and 5 tenths; 831 and 77 hundredths; and 8 and 47 thousandths.
9. Add 403 and 5 hundredths; 765 and 505 thousandths; 87 and 4 tenths; 54 and 327 thousandths; 72 and 8 tenths; and 139 and 57 hundredths.
10.  $337.21 + 56.708 + 33.004 + 89.567 + .843 + 9.17 + 99.009 + 43.519 = \text{what?}$
11. Add 2387 and 5 tenths; 46 and 8 hundredths; 587 and 93 hundredths; 384 and 93 thousandths; 66.0005; 5 and 9 tenths; and 75 and 75 ten-thousandths.
12. Add 29 and 47 thousandths; 5.07; 64 and 79 ten-thousandths; 894.657; 40 and 85 ten-thousandths; 370.846; 58 and 6 millionths, and 479.083.

## ARTICLE 179.—SUBTRACTION OF DECIMALS.

1. From 61.004      take 42.08.
2. From 4.0708     take 1.923.
3. From 3298.1     take .3298.
4. From 47.3965    take 28.788.

5. From 398.04 take 198.0401.
6. From 666.6666 take 70.70707.
7. From 976.001 take 100.876.
8. From 3387.9 take .9982.

9. From 327 and 438 thousandths, take 149 and 89 thousandths.

10. From 83.0041 take 60.809.

11. From 39 and 15 thousandths, take 81935 hundred-thousandths.

12. From 600 units and 8 millionths, take 229 units and 47205 hundred-thousandths.

#### ARTICLE 181.—MULTIPLICATION OF DECIMALS.

- |                        |                        |
|------------------------|------------------------|
| 1. Multiply .347 by 9. | 11. 73.0044 by 15.625. |
| 2. .128 by .4.         | 12. 9.375 by 9.6.      |
| 3. .053 by 15.2.       | 13. 14.4 by 15.5.      |
| 4. 8400 by .05.        | 14. 81000 by .081.     |
| 5. 350 by 1.6.         | 15. .00009 by 370.     |
| 6. 37.004 by 1.5.      | 16. 4.921 by 2900.     |
| 7. .9 by .1.           | 17. 37.428 by 6.0035.  |
| 8. 77 by .0006.        | 18. 8.75 by 8.88.      |
| 9. 32.5 by 32.4.       | 19. 13.047 by 2.099.   |
| 10. 37.35 by 10.       | 20. 9.0807 by 8.0706.  |

21. Multiply 683 units and four-tenths by 3900.

22. Multiply 391 and 8 hundred-thousandths by 225 ten-thousandths.

23. Multiply .0390625 by 427 and 52 hundredths.

24. Multiply 40 and 15625 millionths by 16 and 32 ten-thousandths.

#### ARTICLE 183.—DIVISION OF DECIMALS.

- |                         |                    |
|-------------------------|--------------------|
| 1. Divide 5.685 by 1.5. | 3. 13.5819 by 1.8. |
| 2. 143.125 by 12.5.     | 4. 89.1 by 24.75.  |



- |                         |                     |
|-------------------------|---------------------|
| 5. Divide .8 by 6.25.   | 14. 30.816 by 9.6.  |
| 6. 1760 by 5.5.         | 15. 1.36 by 25.6.   |
| 7. 12.012 by 14.3.      | 16. 66.6 by 8.88.   |
| 8. 29.046 by 2.06.      | 17. 27.5 by 1.76.   |
| 9. 12.48 by 960.        | 18. .7384 by 160.   |
| 10. 48.536488 by 8.008. | 19. 2.3 by 18.      |
| 11. .577812 by .538.    | 20. 1.8 by 23.      |
| 12. .0576 by .00024.    | 21. .00005 by .025. |
| 13. 13.3225 by 36.5.    | 22. 57.6 by 2.56.   |

23. Divide 336 thousandths by 96 ten-thousandths.

24. Divide 20 and 41 ten-thousandths by 337 thousandths.

25. Divide 38 and 19 thousandths by 13 and 4 hundredths.

26. Divide 27 units and two-tenths by 12.8.

27. Divide 5132 and 7 ten-millionths by 51 and 27 ten-thousandths.

28. Divide 350 units and one-tenth by .0389.

29. Divide 725 millionths by 99 and 9375 ten-thousandths.

30. Divide 3.951 by 14 units and four-tenths.

## REDUCTION OF DECIMALS.

### ARTICLE 185.—CASE I.

*Reduce these common fractions to decimals:*

- |                      |                        |                        |                           |
|----------------------|------------------------|------------------------|---------------------------|
| 1. $\frac{3}{8}$ .   | 5. $\frac{27}{80}$ .   | 9. $\frac{127}{640}$ . | 13. $\frac{14}{99}$ .     |
| 2. $\frac{18}{25}$ . | 6. $\frac{17}{20}$ .   | 10. $\frac{77}{40}$ .  | 14. $\frac{47}{999}$ .    |
| 3. $\frac{37}{50}$ . | 7. $\frac{58}{1000}$ . | 11. $\frac{4}{7}$ .    | 15. $\frac{83}{3000}$ .   |
| 4. $\frac{13}{64}$ . | 8. $\frac{37}{1250}$ . | 12. $\frac{12}{37}$ .  | 16. $\frac{775}{77777}$ . |

## ARTICLE 186.—CASE II.

*Reduce these decimals to common fractions:*

1. .75.	5. .0475.	9. .08375.	13. .08125.
2. .35.	6. .00325.	10. .7325.	14. .7073.
3. .625.	7. .02016.	11. .00489.	15. .003125.
4. .925.	8. .327.	12. .000016.	16. .7775.

## ARTICLE 187.—CASE III.

1. Reduce .064 cu. ft. to fraction of a C.
2. Reduce .000075 lb. Troy to fraction of a gr.
3. Reduce .126 qt. to fraction of 1 wine hhd.
4. Reduce .1134 of a min. to fraction of a wk.
5. Reduce .000875 A. to fraction of a P.
6. Reduce .0275 yd. to fraction of a na.
7. Reduce .288 gr. to fraction of an 3.
8. Reduce .00301875 mi. to fraction of a rd.
9. Reduce .792 of a second to fraction of a degree.
10. Reduce .72 of a cu. ft. to fraction of a cu. yd.
11. Reduce .512 oz. to fraction of a cwt.
12. Reduce .872 sq. ft. to fraction of a P.
13. Reduce .0075 of a bu. to fraction of a pt.
14. Reduce .438 of a pt. of beer to fraction of a hhd.

## ARTICLE 188.—CASE IV.

*Find the value in integers*

- |                       |                     |
|-----------------------|---------------------|
| 1. Of .037 cwt.       | 6. .140625 bu.      |
| 2. .78125 lb. Troy.   | 7. .444 sq. mi.     |
| 3. .6975 of a degree. | 8. .7777 T. avoird. |
| 4. .5953125 mi.       | 9. .77 T. of wine.  |
| 5. .9 lb apoth.       | 10. .421875 wk.     |

*Test Examples.—6.*

## ARTICLE 189.—CASE V.

1. Reduce 7 pwt. 12 gr. to the decimal of an oz.
2. Reduce 3 qr. 4 oz. to the decimal of a T.
3. Reduce 1.024 P. to the decimal of an A.
4. Reduce 4 qt. 1.6 pt. to the decimal of a bu.
5. Reduce 3 qr. 2 na. to the decimal of a yd.
6. Reduce 5 fur. 10 rd. to the dec. of a mi.
7. Reduce  $4^{\circ} 18' 45''$  to the dec. of a sign.
8. Reduce 1 lb. to the dec. of 1 lb. 6 oz. 15 pwt.
9. Reduce 1 A. to the dec. of 3 A. 3 R. 25 P.
10. Reduce 1 da. to the dec. of 13 da. 30 min.
11. What decimal of 14 mi. 2 fur. 10 rd., is 4 mi. 2 fur. 11 rd.?
12. What decimal of 6 E. Fr. 5 qr. 3 na., is 3 E. Fl. 2 qr. 3 na.?

## ARTICLE 190.—PROMISCUOUS EXAMPLES.

1. What cost 5.4 yd. of cloth, at \$.45 per yard?
2. What quantity of land can be bought for \$288, at \$6.4 an A.?
3. If .047 T. cost \$56.4, what will 1 T. cost?
4. At the rate of 156.25 mi. per day, how long will it take a ship to pass over 4000 mi.?
5. How much wood at \$5.60 a C. can be bought for \$3.85?
6. What cost 13 C. 96 cu. ft. of wood, at \$4.80 a C.?
7. 3 oz. 10 pwt. 12 gr. of silver, at \$1.20 an oz.?
8. 5 hhd. 23 gal. 2 qt. 1 pt. of wine, at \$136 a hhd.?
9. At 56 ct. a yd., how much cloth can be bought for \$21?
10. At \$2.56 an acre, how much land for \$300.32?
11. At \$.32 a gal., how much beer for \$205?
12. At \$18 an oz., how much gold ore for \$513?

13. Reduce .017 of a year ( $365\frac{1}{4}$  da.) to integers.
14.  $3.7 \text{ yd.} + 1.9 \text{ ft.} = \text{what?}$
15.  $1.3 \text{ oz.} - 19.9 \text{ pwt.} = \text{what?}$
16. 1 lb. is what decimal of 1 lb. 6 oz. 15 pwt.?
17. Add .875 yd., .875 qr., .75 na.
18. What cost a field 77 rd. long, and 41 rd. wide, at \$17.60 an A.?
19.  $.7 \text{ mi.} + .7 \text{ fur.} + .7 \text{ rd.} + .7 \text{ yd.} + .7 \text{ ft.} = \text{what?}$
20. .008 of an E. Fl. is what decimal of 5 E. Fr.?
21. From 3.3 C. take 5.7 cu. yd.
22. Reduce  $\frac{3\frac{3}{5}}{7\frac{2}{3}}$  of  $\frac{5\frac{3}{4}}{10.8}$  to a decimal.
23.  $1.7 \text{ E. Fr.} + 2.7 \text{ E. En.} - 3.7 \text{ E. Fl.} = \text{what?}$
24. Express decimally  $\frac{4}{7}$  of  $\frac{3\frac{1}{2}}{8}$ , and  $\frac{7}{9}$  of  $\frac{6\frac{3}{4}}{11\frac{2}{3}}$ , and divide the former by the latter.

## ARTICLE 191.—RATIO.

*What is the ratio of the following numbers:*

- |                       |  |
|-----------------------|--|
| 1. Of 320 to 600?     | 4. Of 5 yd. to 1 rd.?                    |
| 2. Of 1 ft. to 5 in.? | 5. Of 7 da. to 27 hr.?                   |
| 3. Of 5 in. to 1 ft.? | 6. Of $2\frac{3}{4}$ to $2\frac{3}{4}$ ? |
7. What is the ratio of  $\frac{1}{4}$  to .4?
  8. Of 1 pwt. 1 gr. to 1 lb. 1 oz.?

## ARTICLE 202.—SIMPLE PROPORTION.

1. The first three terms of a proportion are 7, 28, and  $2\frac{1}{4}$ : what is the fourth term?
2.  $16 : 24 :: 14$  to what number?
3. The first, second, and fourth terms are 33, 15, and 55: what is the third?
4. The first, third, and fourth terms are 45, 40, and 48: what is the second?

5. The first, second, and fourth terms are  $6\frac{2}{3}$ , 10, and  $7\frac{1}{2}$ : what is the third?

6. The last three terms are  $9\frac{1}{9}$ ,  $1\frac{1}{8}$ , and  $8\frac{1}{5}$ : what is the first?

7.  $3\frac{1}{3} : 4\frac{1}{4} : : 5\frac{1}{5}$  to what number?

8. The first, third, and fourth terms are 8.4,  $9\frac{1}{3}$ , and  $5\frac{1}{2}$ : what is the second?

### ARTICLE 203.

1. Bought 18 bu. of corn, at the rate of 4 bu. for \$2.18: what did it cost?

2. If 27 yd. of cloth cost \$18.75, what cost 36 yd.?

3. How many yards of cloth,  $\frac{5}{8}$  yd. wide, will line 35 yards,  $\frac{7}{4}$  yd. wide?

4. A can perform a journey in 84 da. of 10 hr. each: how many days of  $10\frac{1}{2}$  hr. each would it require?

5. If 1 oz. 4 pwt. of silver is worth \$1.32, what is 1 oz. worth?

6. 143 men dug a trench in 48 days: how long would it have taken 156 men?

7. If \$100 buy 80 A. of land, what will 100 A. cost?

8. If 15 yards,  $\frac{3}{4}$  of a yard wide, will make a dress, how many yards,  $\frac{5}{8}$  of a yard wide, will make another dress of the same size?

9. A field is 2 fur. 12 rd. long, and 1 fur. 14 rd. wide: another field of equal area is 1 fur. 29 rd. wide: what is its length?

10. A cistern can be filled by 11 equal pipes in 2 hr. 34 min.: how long would 7 pipes of the same size be in filling it?

11. If  $\frac{3}{5}$  of a yd. of cloth cost  $\$1\frac{9}{16}$ , what will  $\frac{8}{15}$  of a yd. cost?

12. If 1000 feet of lumber cost \$11.25, what cost 8936 feet?



13. If 361 yards of calico cost \$39.90, how many yd. can be bought for \$21?

14. A quantity of provisions will last 405 men 48 days: how many men would it feed 72 days?

15. A man bought 2346 bu. of corn at 54ct. a bu.: having lost by fire 510 bu., how much must he charge per bu. for the rest, to lose nothing?

16. How many feet of flooring, 5 in. wide, will be required for a floor 26 ft. by 22 ft. 6 in.?

17. 35 men have provision for 24 da.: if 14 men leave, how long would it feed the remainder?

18. 72 men agree to build an embankment in 39 days: if it is required to complete it in 36 da., how many more men must be employed?

19. How far can 1 T. be carried for \$13, if it can be carried 6 mi. 1 fur. for \$7?

20. A farmer having 212 bu. 2 pk. of corn, worth \$85, sold a part for \$37.40: how much remained?

21. If a man whose property is worth \$3264 pays \$16.32 tax, what tax must C pay, whose property is worth \$6782?

22. If a man build  $\frac{3}{5}$  rods of wall in  $\frac{3}{7}$  of a day, how much can he build in  $\frac{9}{14}$  da.?

23. If a graduated circumference measure 10 ft. 8 in., what will  $59^{\circ} 3' 45''$  measure?

24. A can travel 33 mi. 6 fur., while B travels 56 mi. 2 fur.: how far will A go, while B is going 806 mi. 2 fur.?

25. How far will B go, while A is going 806 mi. 2 fur.?

26. If 4.2 yd. of cloth cost \$15, what will 8 yd. 3 qr. cost?

27. A man failing in business, owes \$36450, and has property worth \$28350: what can he pay A, to whom he owes \$638.10?

28. If 1 bu. of corn is worth 5 pk. of oats, how much corn will pay for 1 bu. oats?

29. If a load be carried 231 mi. for \$18.90, what must be paid for carrying it 605 mi.?

30. How far can it be carried for \$81?

31. If 350 T. of coal are used in smelting 301 T. 5 cwt. 1 qr. of iron, how much iron can be smelted with 500 T. of coal?

32. To ascertain the hight of a steeple, I measure its shadow, which is 387 ft. 6 in. long; the shadow of a ten-foot pole measures 12 ft. 6 in. in length: what is the hight of the steeple?

33. If \$11025 will build a road 13 mi. 6 fur. 10 rd., how long a road can be built for \$16000?

34. If 27 gal. of wine cost \$51 $\frac{1}{5}$ , what cost 9 bl.?

35. A man divided 2 A. 1 R. 1 P. of land into 19 building lots: how many lots of the same size can be made from 5 A. 17 P.?

36. If  $\frac{2}{3}$  will fill 64 prescriptions, how many can be filled from  $7\frac{3}{4}$ ?

37. If a clock gains 3 min. 20 sec. in 24 hours, how much will it gain in 4 da. 19 hr. 12 min.?

38. A can perform a journey in 42 hr., by traveling 1 mi. in 11 min.: how long would it take him, if he travel 1 mi. in 9 min.?

39. If 12 gal. of vinegar cost 64 ct., what will 5 barrels cost?

40. If 8 cu. ft. of water weigh 5 cwt., how much will 5 cu. ft. 576 cu. in. weigh?

41. A man bought 70 barrels at \$1 each: had he paid 25 ct. more apiece, how many could he have bought?

42. A man owning a steamboat, sold  $\frac{4}{11}$  of it for \$11724: what is the remainder worth?

43. If the interest of a certain sum for 2 yr. 10 mon. is \$81.60, what will it be for 1 yr. 10 mon.?

44. A family of 12 persons spend \$510 per year: if two of them leave, what would be the annual expense of the others?

45. In dividing their profits for the year, A received \$555, B \$666: if A's capital was \$2875.25, what capital had B?

46. If 35 men build a road in 8 da., how many men could build the same in  $\frac{5}{7}$  da.?

47. What cost 18625 bricks at \$7.20 per thousand?

48. A crew of 180 men have provisions for 6 wk.: if 30 men join them, how long will the provisions last?

49. If  $\frac{3}{7}$  3 cost \$2.37, what cost  $6\frac{2}{7}$  3?

50. Brown borrowed 354 bu. of corn at 48 ct. per bu.: how many bu. must he pay back, the price of corn having risen 11 ct. per bu.?

51. The fore wheel of a carriage is 14 ft. 7 in. in circumference, and the hind wheel 16 ft. 8 in.: how many revolutions will the hind wheel make while the fore wheel makes 672?

52. How many revolutions will the fore wheel make while the hind wheel makes 672?

53. If a grocer's weights are deficient at the rate of 2 oz. in 4 lb., what is the true weight of a parcel of sugar sold for 112 lb.?

54. At 6 ct. a lb. (false), what will he charge for a parcel whose true weight is 124 lb.?

55. If  $4\frac{4}{5}$  oz. of silver are worth \$5.04, what are 2 lb. worth?

56. A quantity of provisions will last 88 men 56 days: how many men must leave, so that it may last the remainder 77 days?

57. If 47 bu. 2 pk. of corn equal 61 bu. 3 pk. of oats, how many bu. of corn equal 74 bu. 3 pk. of oats?

58. How many bu. of oats equal 62 bu. 2 pk. of corn?

59. If 2 bl. of wine are equal in value to 5 hhd. of beer, how many gallons of wine must be given for 30 gallons of beer?

60. What sum must be paid for carrying 12 T. 3 cwt. 20 miles, if \$14.48 is paid for transporting 3 T. 12 cwt. the same distance?

61. A contractor sent in a bill for \$1900 for grading 7 mi. 3 fur. 15 rd. of road: it was found, on examination, that the road was not so long by 1 fur. 25 rd.: how much must he reduce his bill?

#### ARTICLE 205.—COMPOUND PROPORTION.

1. If 8 men earn \$630 in 7 wk., how much will 6 men earn in 10 wk.?

2. If 27 men build 72 rd. of wall in 16 da., how many days will it take 36 men to build 90 rd.?

3. A field 30 rd. long, and 20 rd. wide, cost \$48: what cost another field, 50 rd. long, and 15 rd. wide?

4. If 13 lb. 8 oz. of wool make 15 yd. 5 quarters wide, how much cloth 5 quarters wide can be made from 15 lb. of wool?

5. If the wages of 72 men for 5 days is \$450, how many men may be hired for 12 days for \$540?

6. If the rent of a house worth \$3200 is \$240 for 9 mon., for what sum per year must a man rent a house worth \$3500?

7. If 6 men in 8 da. of 9 hr. each, build 192 cu. ft. of wall, how much will 8 men build in 9 days of 10 hr. each?

8. How many tiles 9 in. long, and 8 in. wide, will cover the same surface as 43 slabs, each 1 yd. 4 in. long, and 1 ft. 6 in. wide?

9. If the oats for 10 horses for 8 mon. cost \$450, when oats are 37 ct. 5 m. per bu., how long can 20 horses be fed for \$1050, when oats are worth 50 ct. a bu.?

10. If the bricks for a wall 30 ft. long, 24 ft. high, and 1 ft. thick, cost \$72, when bricks are worth \$5 per thousand, what will be the cost of the bricks for a wall 128 ft. long, 37 ft. 6 in. high, and 16 in. thick, bricks being worth \$6 per thousand?

11. If a loaf weighing  $12\frac{4}{5}$  oz. is worth 2 ct., when flour is \$4 a bl., what is the value of a loaf weighing  $10\frac{2}{3}$  oz., when flour is \$6 $\frac{2}{5}$  a bl.?

12. If 14 men in 15 da. of 10 hr. each, can mow 288 A. 3 R., how many men must be employed to mow 387 A. 32 P. in 32 da. of 8 hr. each?

13. A road was to be paved a distance of 800 yd.: if the first 300 yd. are paved in 8 da. of 12 hr. each, by 10 men, how many men will be required to pave the balance in 5 da. of 8 hr. each?

14. If the freight on 14 boxes of tobacco, each weighing 1 cwt. 1 qr., is \$8.40 for 30 mi., what must be paid on 20 bl. of sugar, each weighing 2 cwt. 1 qr. 15 lb., carried 75 mi.?

15. If a mass of iron 7 ft. long, 5 ft. wide, and 3 in. thick, weigh 2 T., what is the weight of a block of wood 25 ft. long, 3 ft. 6 in. wide, and 1 ft. 9 in. thick, iron being 7 times as heavy as wood?

16. If a piece of cloth 31 yards 1 quarter long, and 1 yard 2 quarters wide, is worth \$112.50, what is the value of a piece of similar cloth 43 yards 3 quarters long, and 2 yards 1 quarter wide?

## ALIQUOTS, OR PRACTICE.

### ARTICLE 207.—CASE I.

1. What cost 45 bu. of corn, at  $33\frac{1}{3}$  ct. a bu.?
2. 44 yd. of silk, at \$1.68 $\frac{3}{4}$  a yd.?
3. 80 clocks, at \$3.35 each?
4. 18 curtains, at \$2.37 $\frac{1}{2}$  each?
5. 47 A. of land, at \$5.05 an A.?
6. 42 handkerchiefs, at 75 ct. each?
7. 220 yd. of calico, at  $31\frac{1}{4}$  ct. a yd.?
8. 246 yd. of silk, at \$1.04 $\frac{1}{6}$  a yd.?
9. 172 cords of wood, at \$4.65 a C.?
10. 1234 bu. of barley, at 85 ct. a bu.?



## ARTICLE 208.—CASE II.

1. Find the cost of 2 bu. 3 pk., at \$2.40 a bu.
2. Of 4 lb. 7 oz. 5 pwt., at \$14.40 per lb.
3. Of 7 C. 88 cu. ft. of wood, at \$5.76 a C.
4. Of 3 hhd. 35 gal. of beer, at \$34.02 a hhd.
5. Of 3 hhd. 35 gal. of molasses, at \$34.02 a hhd.
6. Of 5 bu. 1 pk. 7 qt., at \$2.25 a bu.
7. Of 13 A. 3 R. 27 P., at \$7.09 an A.
8. Of 2 cwt. 1 qr. 17 lb. 5 oz., at \$7.58 per cwt.
9. Of 2 T. 3 hhd. 19 gal., at \$75 a tun.
10. Of 2 bl. 13 gal. 1 qt. of beer, at \$9 a bl.
11. Of 29 eggs, at 17 ct. a doz.
12. Of 3 yd. 3 qr. 3 na., at \$1.25 per qr.

## PERCENTAGE.

## ARTICLE 210.—CASE I.

- |                                  |  |
|----------------------------------|--|
| 1. What is 4 % of 800?           | 13. 4800 % of $\frac{1}{8}$ ?                |
| 2. 12 % of 730?                  | 14. 1000 % of 1000?                          |
| 3. 19 % of 10000?                | 15. $\frac{1}{23}$ % of 200100?              |
| 4. 47 % of 360?                  | 16. .1 % of .1?                              |
| 5. $\frac{1}{2}$ % of 700?       | 17. .001 % of .001?                          |
| 6. .1 % of 1000000?              | 18. 100000 % of 1000000?                     |
| 7. .01 % of 1000?                | 19. $100\frac{1}{3}$ % of $100\frac{1}{2}$ ? |
| 8. $\frac{1}{40}$ % of 828?      | 20. 5 % of 70 gal.?                          |
| 9. $\frac{5}{6}$ % of 1260?      | 21. $21\frac{1}{4}$ % of 27 lb. Troy?        |
| 10. $5\frac{3}{8}$ % of 720 bu.? | 22. 64 % of \$15.625?                        |
| 11. 104 % of 3375?               | 23. 31 % of \$947.50?                        |
| 12. 7000 % of 2?                 | 24. 105 % of 105?                            |

25. A man sold 18 % of a farm of 240 A.: how much did he sell?

26. A man going to market with 15 dozen of eggs, broke  $3\frac{1}{3}$  % of them: how many did he break?

27. A city of 200000 inhabitants lost, in 5 weeks, by cholera, 4 % : how many was that per week?

28. A man worth \$40000, lost 16 % of it by fire, and 15 % by robbery: how much did he lose?

29. The earth contains fifty million sq. mi. of land surface, of which the United States own  $6\frac{1}{4}$  % : what is the area of that country?

30. A lot 30 ft. wide, is assessed at \$155 per front foot: what would be the tax, at  $1\frac{3}{5}$  % ?

31. An army, on the first of April, contained 13600 men; it lost, on an average,  $\frac{3}{8}$  % daily: how many were left on the fourth of the succeeding July?

32. A house cost \$4000, of which 18 % was paid for bricks at \$8 a thousand: how many bricks were there in the house?

33. On a turnpike 30 miles long, the receipts for a year were \$26100, of which 7 % was profit: what was the gain per mile?

34. If a boy spend 20 % of the time in study, how long does he study daily?

35. By what must 7 % of 400 be multiplied, to make 15 % of 700?

36. A man bought 2 houses for \$6000: the first cost twice as much as the second: he sold them, gaining 5 % on the first, and 7 % on the second: how much did he gain on both?

37. John is 4 ft. 6 in. in height: his brother James is 25 % taller: what is the height of James?

38. From a piece of cloth containing 33 yd. 3 qr., 15 % was cut off: how much remained?

39. Of a mass of ore containing 10 T. 3 qr., 24 % was lost in smelting: how much remained?

40. A man had 353 hogs: he sold 28, and lost 28 % of the remainder: how many had he left?

41. A merchant having 470 bu. of wheat, sold 24 % of it, at 80 ct. a bu.: how much did he receive for it?

42. A man having 52 lb. 1 oz. of silver, had 48 % of it made into spoons, weighing 1 oz. 17 pwt. 12 gr. each: how many spoons were made?

43. A man sold goods for \$13600, of which  $7\frac{1}{2}$  % was profit: find the cost.

44. A ship sailed  $13^{\circ} 16' 40''$ , of which 56 % was traversed in the first 7 days: what distance did the ship sail per day?

45. Sixty was multiplied by 60 % of 60: what was the product?

### ARTICLE 211.—CASE II.

- |  |  |
|--|--|
| 1. What % of 200 is 14?                          | 13. Of 200 is 17?                            |
| 2. Of 350 is 21?                                 | 14. Of 800 is 4?                             |
| 3. Of 210 is 147?                                | 15. Of \$375 is \$1.25?                      |
| 4. Of 625 is 75?                                 | 16. Of 1200 is 2.4?                          |
| 5. Of 640 is 864?                                | 17. Of \$300 is \$1.875?                     |
| 6. Of \$300 is \$27?                             | 18. Of 777 is 111?                           |
| 7. Of 800 A. is 128 A?                           | 19. Of $31\frac{1}{4}$ is $39\frac{1}{16}$ ? |
| 8. Of 1350 is 999?                               | 20. Of 132.75 is 59?                         |
| 9. Of 1875 is 2250?                              | 21. Of 75 is 750?                            |
| 10. Of $\$312\frac{1}{2}$ is $\$53\frac{1}{3}$ ? | 22. Of 6000 is 5.4?                          |
| 11. Of 72.25 is 20.23?                           | 23. Of 1224 is 1326?                         |
| 12. Of $\$99\frac{3}{4}$ is \$15.96?             | 24. Of 165 is 1321.32?                       |

25. In a farm of 400 A. was a meadow containing 44 A.: what % of the farm was it?

26. From a barrel of flour, 28 lb. had been used: what % of the barrel remained?

27. From a field 75 rd. long, and 40 rd. wide, the owner sells a lot 15 rd. long, and 10 rd. wide: what % of the field is sold?

28. What % of any number is its  $\frac{3}{4}$ ?

29. By what % of 50 must 75 be multiplied to make the product 3075?

30. An agent collected \$33400, of which he received \$1837: what % did he receive?

31. A barrel, before shipping, contained 40 gal. 2 qt.; after, 38 gal. 1 pt.: what % had leaked out?

32. A man bought 350 A. of land for \$40 an acre, and sold a part for \$2240, at the same rate: what % of the land did he sell?

33. The product of 80 by 90 is what % of the product of 90 by 100?

34. A road was projected 201 mi. 2 fur. long, and 172 mi. 4 fur. was completed: what % of the length is unfinished?

35. A field 20 rd. wide contains 10 A.: the width is what % of the length?

36. A man having \$300, bought 3 boxes, each containing 80 yards of cloth at  $87\frac{1}{2}$  ct. a yard: what % of his money has he left?

#### ARTICLE 213.—COMMISSION.

1. An agent sells 220 bl. of flour, at \$4.75 a bl.: find his commission at 2 %.

2. Sold 100 hogsheads of sugar, of 1100 lb. each, at  $5\frac{3}{4}$  ct. a lb.: find the commission at  $1\frac{1}{2}$  %.

3. What will a real estate agent receive for selling a farm of 270 A. 2 R., at \$25.60 an A., his commission being  $1\frac{1}{4}$  %?

4. A lawyer collects a debt of \$357.28, charging 5 %: what will his commission be?

5. What is the commission on \$526 at  $\frac{1}{2}$  %, \$873 at  $\frac{1}{3}$  %, \$384 at  $2\frac{1}{2}$  %, and \$80 at  $4\frac{1}{5}$  %?

6. Sales for A, \$237 at  $3\frac{1}{3}$  %; for B, \$240 at 4 %: which will receive the most from the agent, and how much more?

7. An agent having sold wheat, kept \$54, and sent the owner \$1746: what % commission did he charge?

8. A factor sold for a man 207 bl. of beef at \$14 a bl., and sent him \$2753.10: what % commission did he retain?

9. Sales for A \$250, at 3 %; for C, \$300; commission from both \$18; what % commission was charged C?

10. An agent sold 50 bl. of vinegar at \$5 a bl., and 40 boxes of raisins at \$3 a box, and sent the owner \$358.90: what was his rate of commission?

11. One agent sold a house for \$3500 at 1%; another sold a farm for \$100 more, and sent me \$45 less than the first: what % did the second charge?

### ARTICLE 214.

1. A man sent to an agent \$2511 to buy flour: what must he spend, reserving  $1\frac{1}{4}$  % for commission?

2. After deducting  $2\frac{1}{2}$  % commission, what must an agent spend for a man from whom he receives \$1681?

3. 40 A. of land cost the owner \$2484: the agent charged  $3\frac{1}{2}$  % commission for buying: what was the cost per A. to the agent?

### ARTICLE 215.—INSURANCE.

1. What must be paid for insuring \$3260 on a mill, at  $1\frac{3}{4}$  %?

2. What is the charge for insuring a house for \$1705, at 1 %; a shop for \$630, at  $1\frac{1}{2}$  %; and a store for \$3446, at  $1\frac{1}{2}$  %, the policy costing \$1?

3. What must I pay for insuring  $\frac{5}{8}$  of a factory valued at \$340000, at  $\frac{5}{8}$  %?

4. Paid \$75 for insuring  $\frac{3}{5}$  of a store, at  $1\frac{1}{4}$  %: what was the store worth?

5. I insured  $\frac{2}{3}$  of a shop worth \$3600, and  $\frac{4}{5}$  of a house worth \$6000, paying \$126: what was the rate of insurance?



## ARTICLE 216.

1. If a house is worth \$1470, what sum must be insured at 2 % to cover property and premium?

2. At  $\frac{2}{3}$  %, what sum must be insured to cover premium and property worth \$1043?

3. What must be paid for insuring \$7155 at  $\frac{5}{8}$  %, to cover property and premium?

## ARTICLE 217.—STOCKS.

1. What is the value of 13 shares railroad stock (\$50 each), at par?

2. What is the value of 18 shares mining stock (\$75 each), at 8 % discount?

3. What must be paid for fifteen \$100 shares of bank stock, at 18 % advance?

4. How much money must be given with nine \$100 shares, at 15 % discount, in exchange for eight \$100 bonds, at 2 % discount?

5. How many \$50 shares, at 8 % discount, must be given for 23 bonds (\$100 each), at 2 % premium?

6. Bought 18 shares (\$50 each), at  $\frac{1}{2}$  % discount, and sold at  $\frac{3}{4}$  % premium: find my gain.

7. Bought 120 shares canal stock (\$10 each), at  $1\frac{1}{4}$  % advance, and sold at  $\frac{2}{3}$  % discount: find my loss.

## ARTICLE 218.—BROKERAGE.

1. Exchanged \$600 in gold, at a premium of  $\frac{3}{8}$  %, for silver: what sum will I gain?

2. How much more must I pay for a draft for \$960, at  $\frac{5}{8}$  % advance, than for \$960 gold, at  $\frac{1}{2}$  % advance?

3. What sum in gold must I pay for \$350 in paper, at  $1\frac{1}{7}$  % discount?

4. What sum in paper must I pay for \$346 in gold, at  $1\frac{1}{7}$  % premium?

5. What must I pay for a sight draft for \$1225.70, at  $\frac{7}{8}\%$  premium?

6. What cost a draft on New Orleans for \$873.48, at  $\frac{5}{8}\%$  discount?

## INTEREST.

### ARTICLE 220.—CASE I.

#### *Find the Interest*

1. Of \$300 for 1 yr., at 7 %.
2. Of \$450 for 2 yr., at 6 %.
3. Of \$775 for 4 yr., at 5 %.
4. Of \$1036 for 3 yr., at 6 %.
5. Of \$273 for 10 yr., at 10 %.
6. Of \$327.50 for 9 yr., at 4 %.
7. Of \$749.60 for 11 yr., at  $7\frac{1}{2}\%$ .
8. Of \$453.25 for 9 yr., at  $5\frac{1}{7}\%$ .
9. Of \$638.72 for 5 yr., at  $8\frac{3}{4}\%$ .
10. Of \$333.36 for 12 yr., at  $3\frac{1}{8}\%$ .
11. Of \$456.78 for 5 yr., at  $6\frac{2}{3}\%$ .
12. Of \$987.54 for 10 yr., at  $8\frac{1}{3}\%$ .

#### *Find the Amount*

13. Of \$473 for 2 yr., at 8 %.
14. Of \$294.70 for 4 yr., at  $7\frac{1}{2}\%$ .
15. Of \$365.25 for 8 yr., at 7 %.
16. Of \$156.25 for 7 yr., at  $7\frac{1}{5}\%$ .
17. Of \$999.92 for 4 yr., at  $9\frac{3}{8}\%$ .
18. Of \$940.45 for 8 yr., at  $5\frac{5}{7}\%$ .
19. Of \$800.50 for 3 yr., at 9 %.
20. Of \$400.90 for 5 yr., at 4 %.
21. Of \$1238.48 for 7 yr., at  $5\frac{1}{4}\%$ .
22. Of \$2500.16 for 8 yr., at  $12\frac{1}{2}\%$ .
23. Of \$327.50 for 4 yr., at  $5\frac{1}{5}\%$ .
24. Of \$666.06 for 6 yr., at  $6\frac{2}{3}\%$ .

## ARTICLE 221.—CASE II.

*Find the Interest*

1. Of \$400 for 4 mon., at 6 %.
2. Of \$36 for 3 mon., at 5 %.
3. Of \$192 for 6 mon., at 8 %.
4. Of \$480 for 7 mon., at 5 %.
5. Of \$540 for 16 days, at 5 %.
6. Of \$880 for 19 days, at 9 %.
7. Of \$990 for 11 mon., at 4 %.
8. Of \$320.40 for 11 days, at 8 %.
9. Of \$500 for 20 days, at  $7\frac{1}{5}$  %.
10. Of \$810 for 28 days, at  $6\frac{2}{3}$  %.
11. Of \$554.40 for 29 days, at  $4\frac{1}{7}$  %.

*Find the Amount*

12. Of \$320 for 17 days, at 9 %.
13. Of \$504 for 13 days, at 5 %.
14. Of \$357.12 for 10 days, at 5 %.
15. Of \$37.50 for 18 days, at 8 %.
16. Of \$576 for 23 days, at 5 %.
17. Of \$948.40 for 25 days, at 9 %.
18. Of \$112.50 for 26 days, at 4 %.
19. Of \$15 for 3 days, at 3 %.
20. Of \$2340 for 7 days, at 6 %.
21. Of \$77.70 for 9 days, at  $6\frac{2}{3}$  %.
22. Of \$920.80 for 27 days, at 12 %.

## ARTICLE 222.—GENERAL RULE.

*What is the Interest*

1. Of \$620 for 3 yr. 4 mon., at 6 % ?
2. Of \$84.60 for 7 yr. 6 mon., at 4 % ?
3. Of \$349.20 for 3 yr. 5 mon., at 5 % ?
4. Of \$746 for 7 yr. 7 mon., at 6 % ?

*Test Examples.—7*

5. Of \$525.75 for 1 yr. 15 da., at 8 % ?
6. Of \$729.30 for 9 mon. 10 da., at 6 % ?
7. Of \$831.46 for 1 yr. 2 mon. 15 da., at 7 % ?
8. Of \$656.89 for 3 yr. 4 mon. 6 da., at 6 % ?
9. Of \$777.66 for 9 yr. 9 mon. 9 days, at 7 % ?
10. Of \$1234.56 for 3 yr. 8 mon. 9 days, at  $4\frac{1}{2}$  % ?
11. Of \$9257.38 for 4 yr. 7 mon. 11 days, at  $9\frac{3}{5}$  % ?
12. Of \$959.27 for 11 yr. 11 mon. 11 days, at  $7\frac{2}{3}$  % ?
13. Find the Amount of \$500 for 5 yr. 3 mon., at 6 %.
14. Of \$723.75 for 5 yr. 20 days, at 3 %.
15. Of \$849.36 for 7 yr. 5 days, at 4 %.
16. Of \$921.54 for 10 yr. 10 mon. 10 days, at  $7\frac{1}{2}$  %.
17. Of \$887.46 for 3 yr. 17 days, at  $8\frac{1}{4}$  %.
18. Of \$923.83 for 4 yr. 2 mon. 9 days, at  $4\frac{4}{5}$  %.
19. Of \$891.04 for 6 yr. 23 days, at 5 %.
20. Of \$346.80 for 7 yr. 5 mon., at  $9\frac{1}{2}$  %.
21. Of \$462.84 for 9 yr. 3 mon. 14 days, at  $8\frac{1}{5}$  %.
22. The interest of \$450, from April 4, 1852, to July 24, 1856, at 8 %.
23. The interest of \$594.72, from December 1, 1855, to June 13, 1860, at 5 %.
24. The interest of \$99.20, from June 20, 1850, to June 14, 1860, at  $6\frac{3}{4}$  %.
25. The amount of \$737.64, from May 29, 1840, to June 4, 1857, at 7 %.
26. The interest of \$29.16, from January 20, 1854, to April 10, 1860, at  $8\frac{1}{3}$  %.
27. The amount of \$375, from Sept. 8, 1850, to Jan. 29, 1858, at 6 %.
28. The amount of \$777.72, from Nov. 18, 1853, to May 6, 1859, at 6 %.
29. The amount of \$5783.40, from July 1, 1854, to Jan. 16, 1859, at  $6\frac{2}{3}$  %.
30. The interest of \$9876.54, from Nov. 8, 1855, to Mar. 3, 1860, at  $5\frac{1}{3}$  %.

## ARTICLE 224.

*At 6 %, what is the interest*

1. Of \$720 for 3 yr. 4 mon. 16 da.?
2. Of \$425 for 5 yr. 6 mon. 3 da.?
3. Of \$729.48 for 3 yr. 5 mon. 20 da.?
4. Of \$123.44 for 7 yr. and 15 da.?
5. Of \$291.36 for 9 mon. and 18 da.?
6. Of \$451.80 for 5 yr. 4 mon. 5 da.?
7. Of \$1234.14 for 2 yr. 7 mon. 6 da.?
8. Of \$7891.05 for 7 yr. 7 mon. 7 da.?
9. Of \$1753.42 for 3 yr. 10 mon. 18 da.?
10. Of \$3099.76 for 4 yr. 3 mon. 29 da.?
11. Of \$9917.68 for 6 yr. 6 mon. 2 da.?
12. Of \$10253.92 for 7 yr. 11 mon. 13 da.?

## PARTIAL PAYMENTS.

## ARTICLE 226.—LEGAL RULE.

1. A note of \$360 is dated May 15, 1855. Int. 10 %.  
 Indorsed, July 5, 1856, \$25. Dec. 5, 1857, \$107 :  
 what was due April 20, 1858 ?
2. A note of \$200 is dated Jan. 18, 1851. Int. 6 %.  
 Indorsed, July 18, 1853, \$20. Jan. 18, 1856, \$60 :  
 what was due May 7, 1857 ?
3. A note of \$500 is dated June 25, 1858. Int. 6 %.  
 Indorsed, Nov. 19, 1859, \$62. July 4, 1860, \$48 :  
 what was due Sept. 8, 1860 ?
4. A note of \$400 is dated May 17, 1855. Int. 5 %.  
 Indorsed, Nov. 17, 1856, \$70. Jan. 6, 1858, \$17.  
 May 19, 1859, \$28.10 :  
 what was due Aug. 9, 1861 ?
5. A note of \$720 is dated Feb. 19, 1851. Int. 5 %.  
 Indorsed, Mar. 16, 1852, \$30. April 23, 1853, \$40.  
 May 17, 1854, \$106.80 :  
 what was due July 23, 1855 ?



6. A note of \$480 is dated Dec. 14, 1854. Int. 8 %.

Indorsed, April 29, 1855, \$44.40.      June 9, 1856, \$70.

Jan. 24, 1857, \$81.      April 7, 1858, \$80:

what was due Jan. 2, 1860?

7. A note of \$750 is dated April 13, 1854. Int. 6 %.

Indorsed, May 27, 1855, \$50.      June 11, 1856, \$45.

Sept. 29, 1857, \$60.      July 5, 1858, \$35:

what was due June 13, 1859?

8. A note of \$300 is dated Jan. 19, 1854. Int. 6 %.

Indorsed, May 11, 1855, \$20.      Mar. 29, 1856, \$49.50.

June 19, 1857, \$73.80.      July 4, 1858, \$10.

July 19, 1859, \$53:

what was due Jan. 15, 1861?

#### ARTICLE 227.—SECOND RULE.

1. A note of \$540 is dated Jan. 19, 1859. Int. 8 %.

Indorsed, June 7, 1859, \$50.      Aug. 13, 1859, \$90.

Oct. 4, 1859, \$135:

what was due Dec. 16, 1859?

2. A note of \$720 is dated May 19, 1854. Int. 5 %.

Indorsed, June 16, 1854, \$120.      Aug. 16, 1854, \$120.

Oct. 28, 1854, \$240.      Nov. 4, 1854, \$240:

what was due May 13, 1855?

#### ARTICLE 228.—CONNECTICUT RULE.

1. A note of \$504 is dated May 5, 1850. Int. 5 %.

Indorsed, Mar. 5, 1851, \$144.      Feb. 5, 1852, \$112:

what was due Jan. 5, 1854?

2. A note of \$600 is dated Jan. 9, 1850. Int. 6 %.

Indorsed, May 9, 1850, \$125.      Jan. 9, 1852, \$116.36.

June 1, 1852, \$180.      Jan. 9, 1854, \$174.18:

what was due May 12, 1856?

#### PROBLEMS IN INTEREST.

#### ARTICLE 230.—PROBLEM II.

1. Principal \$500, interest \$120, rate 6 %: find the time.

2. A man paid \$375 for the use of \$1000 at 6 % : how long had he kept it?

3. How long will it take \$450, at 8 %, to gain \$294 interest?

4. How long \$400, at 6 %, to gain \$17.20?

5. In what time will \$500 amount to \$600, at 5 %?

6. In what time will \$640 amount to \$800, at 8 %?

*Find the time in the following:*

7. Principal \$400, interest \$18.20, rate 7 %.

8. Principal \$540, interest \$360, rate  $6\frac{2}{3}$  %.

9. Principal \$500, amount \$650, rate 8 %.

10. Principal \$720, amount \$1000, rate  $3\frac{1}{2}$  %.

11. A man having borrowed \$350 at 8 %, paid at settlement \$396.20: how long had he kept it?

12. How long must I lend \$500 at 6 %, to receive \$99.25 interest?

### ARTICLE 231.—PROBLEM III.

1. The interest of \$300 for 4 yr. was \$60: what was the rate %?

2. Interest \$40, principal \$800, time 8 mon.: find the rate %.

3. A broker charged \$40 for the loan of \$200 for 2 yr.: what was the rate %?

4. A man pays \$6 for the use of \$450 for 20 da.: what rate % was that?

5. At what rate % will the interest of \$720 for 2 yr. 9 mon. 10 da. equal \$90?

6. \$400 in 5 yr. amounted to \$525: find the rate %.

*Find the rate per cent. in the following:*

7. Amount \$600, interest \$120, time 6 yr. 3 mon.

8. Amount \$900, principal \$750, time 3 yr. 4 mon.

9. Prin. \$660, int. \$225.50, time 5 yr. 1 mon. 15 da.

10. A man having lent some money for 4 yr. 6 mon., received on settlement \$1550, of which \$300 was interest: what was the rate %?

11. At what rate % will any sum double itself in 13 yr. 4 mon.?

12. At what rate %, in 11 yr. 3 mon.?

#### ARTICLE 232.—PROBLEM IV.

*Find the Principal in the following:*

1. Interest \$200, time 5 yr., rate 8 %.

2. Interest \$77, time 2 yr., rate  $5\frac{1}{2}$  %.

3. Interest \$97, time 8 yr. 1 mon., rate 6 %.

4. Int. \$33.50, time 1 yr. 1 mon. 12 da., rate  $7\frac{1}{2}$  %.

5. What principal, at 5 %, will give 3 ct. interest, in 6 months?

6. A man lent a sum of money for 3 yr. 9 mon. 24 da., at 6 %, and received for interest \$54.96: what sum did he lend?

7. What sum, at 5 %, for 7 yr. 7 mon. 6 da., will gain \$75.05 interest?

8. What sum, at  $6\frac{3}{4}$  %, for 3 yr. 6 mon. 20 da., will gain \$118.50?

#### ARTICLE 233.—COMPOUND INTEREST.

*Find the Amount at Compound Interest*

1. Of \$500 for 2 yr., at 5 %.

2. Of \$600 for 1 yr. 6 mon., at 6 %.

3. Of \$80 for 4 yr., at 5 %.

4. Of \$250 for 4 yr., at 8 %.

5. Of \$125 for 6 yr., at 5 %.

*Find the Compound Interest*

6. Of \$500 for 4 yr., at 6 %.

7. Of \$1000 for 3 yr., at 7 %.

8. Of \$400 for 2 yr. 8 mon., at 5 %.

9. Find the amount of \$375 for 2 yr., at 8 %, compound interest, payable semi-annually.

10. Find the compound interest of \$600 for 3 yr., at 6 % interest, payable semi-annually.

### ARTICLE 236.—DISCOUNT.

*If money is worth 6 %, what is the Present Worth*

1. Of \$600 due 10 yr. hence ?
2. Of \$400 due 4 yr. 8 mon. hence ?
3. Of \$520 due 5 yr. hence ?
4. Of \$300 due 1 yr. hence ?
5. Of \$304.70 due 6 yr. 5 mon. hence ?
6. Of \$1209 due 5 yr. 8 mon. 20 da. hence ?
7. Of \$700 due in 5 yr. ?
8. Of \$726.10 due in 3 yr. 6 mon. 1 da. ?
9. Of \$3782 due in 4 yr. 4 mon. 4 da. ?

*What is the Discount*

10. Of \$800 due in 10 yr. ?
11. Of \$94.50 due in 10 mon. ?
12. Of \$720 due in 3 yr. 4 mon. ?
13. Of \$664 due in 5 yr. 5 mon. 18 da. ?
14. Of \$800 due in 6 yr. ?
15. Of \$600 due in 6 yr. 6 mon. ?
16. Of \$1449 due in 7 mon. ?
17. At 6 %, what will be the discount for paying \$239.40, 2 yr. 4 mon. before due ?
18. At 6 %, what should be paid for a note of \$225, 2 yr. 1 mon. before due ?
19. A note of \$500 is due Jan. 18, 1861 : what was it worth Nov. 18, 1856, money worth 6 % ?
20. What deduction should be made on \$392.50, due July 14, 1865, if paid May 24, 1860 ? (6 %.)
21. \$500 was due Oct. 4, 1861 : what should be paid Jan. 16, 1859 ? (6 %.)

## ARTICLE 237.—PAYMENTS AT DIFFERENT TIMES.

1. A man bought a lot of sugar for \$1091.80, one-half payable in 6 mon., balance in 1 yr.: what was the cash value, money worth 6 % ?

2. Find the present value of a debt of \$212, of which one-half is due now, balance in 1 yr. (6 %.)

3. Of a debt of \$560, one-fourth in 1 yr., one-fourth in 2 yr., one-seventh in 3 yr., balance in 4 yr. (6 %.)

## ARTICLE 238.—DISCOUNT AND INTEREST COMPARED.

1. Amount \$560, time 5 yr., rate 8 %: what is the principal?

2. Amount \$720, time 7 yr. 4 mon., rate 6 %: find the principal.

3. Amount \$400, time 6 mon., rate 18 %: find the interest.

## ARTICLE 240.—BANK DISCOUNT.

*Find the Bank Discount of a note of*

1. \$200, payable 1 mon. after date.

2. \$1440, payable 60 da. after date.

3. \$585, payable 20 da. after date.

4. \$300, payable 30 da. after date.

5. \$750, payable 37 da. after date.

6. \$1234, payable 10 da. after date.

7. \$569.23, payable 43 da. after date.

8. \$597.20, payable 56 da. after date.

9. \$777.77, payable 77 da. after date.

*Find the proceeds of a note of*

10. \$600, payable 1 mon. after date.

11. \$500, payable 33 da. after date.

12. \$1000, payable 2 mon. after date.

13. \$1250, payable 34 da. after date.

14. \$778.80, payable 5 mon. after date.



15. Find the proceeds of a note of \$929.78, payable 38 da. after date.

16. A consignment of pork was sold for \$3275.60, half cash, the balance, a note at 60 days: if the note is discounted in bank at 10 %, what will be the net proceeds of the sale?

17. Sold 50 bl. of wine, each containing 31 gal. 2 qt., at \$2.40 a gal., receiving a note at 90 da.: what would be the proceeds of this note, discounted at  $7\frac{1}{2}$  %?

18. What will be the proceeds of a note of \$999, payable in 97 da.? (8 %.)

### ARTICLE 241.

1. For what sum, payable in 60 days, must I give my note, so that I may obtain \$800, when discounted at 6 %?

2. What must be the face of a note at 4 mon., for which I shall receive \$750 from a bank, discounting at 12 %?

3. Proceeds \$393.80, time 59 da., rate 9 %: find the face?

## PROFIT AND LOSS.

### ARTICLE 243.—CASE I.

1. Goods that cost \$400, were sold at a gain of 14 %: what was the gain?

2. Goods costing \$375, were sold at a loss of 12 %: what was the loss?

3. Cost \$700, loss  $3\frac{3}{4}$  %: find the loss.

4. Cost \$783, loss  $3\frac{1}{3}$  %: find the loss.

5. Cost \$8340, loss  $7\frac{1}{2}$  %: find the loss.

6. Cost 75 ct., loss  $2\frac{2}{3}$  %: find the loss.

7. Cost \$729.64, gain  $7\frac{1}{8}$  %: find the gain.

8. Cost \$678.93, gain 7.4 %: find the gain.

9. Cost \$784.35, gain 3.8 %: find the gain.

## ARTICLE 244.—CASE II.

*Find the selling price in the following :*

1. Cost \$400,      loss      17 %.
2. Cost \$640,      gain       $7\frac{1}{2}$  %.
3. Cost \$530,      loss       $8\frac{1}{5}$  %.
4. Cost \$491.80, loss      80 %.
5. Cost \$723.86, gain  $100\frac{1}{2}$  %.
6. Cost \$984.85, gain       $1\frac{1}{2}$  %.
7. Cost \$700.08, gain       $4\frac{1}{6}$  %.
8. Cost \$910.11, loss       $13\frac{1}{3}$  %.

## ARTICLE 246.—CASE III.

1. Goods cost \$50, and sold for \$40: what % was lost?
2. Goods cost \$40, and sold for \$50: what % was gained?
3. Goods costing \$200, were sold at an advance of \$38: what % was gained?
4. What % is lost by selling for \$11, that which cost \$13?
5. A man sold a farm for \$900, gaining \$100; what % did he gain?
6. A man bought 5 bu. 1 pk. 7 qt. of peaches, at \$1.28 a bu., and sold the lot for \$10: what % did he gain?
7. What % is gained by buying beer at 25 ct. a gal., and selling at 5 ct. a pint?
8. Gunpowder was bought at 24 ct. a lb., and sold at 51 ct. a lb.: what % was gained?
9. What % is lost by selling for  $\$5\frac{5}{8}$ , that which cost  $\$5\frac{5}{6}$ ?
10. What % is gained by selling for \$43.2, that which cost  $\$38\frac{1}{4}$ ?

ARTICLE 247.—CASE IV.

1. Sold a house for \$1500, gaining 20 % : what was the cost?
2. Sold a farm for \$7344, losing 20 % : what was the cost?
3. Selling price \$77.50, gain 24 % : find the cost.
4. Selling price \$399, loss 24 % : find the cost.
5. Selling price \$500, loss 17 % : find the cost.
6. A and B each sold a house for \$1800; A gained 20 %, B lost 20 % : what was the difference in the cost of the two houses?
7. By selling flour at \$5.04 a barrel,  $14\frac{2}{7}$  % was lost: what was the cost per lb.?

ARTICLE 248.—PROMISCUOUS EXAMPLES.

1. A carriage that cost \$256, was sold at a loss of  $18\frac{3}{4}$  % : what sum was received for it?
2. Sold a gun for \$33.30, gaining 48 % : what was the cost?
3. Sold an interest in a steamboat for \$2150, losing \$975: what % did I lose?
4. Sold a house that cost \$3300, for \$2805: what % did I lose?
5. By selling molasses 5 % below cost, I lose 2 ct. a gal.: what was the cost per gal.?
6. A shop cost \$3250; when sold  $14\frac{2}{3}$  % was lost: what was the loss?
7. By selling beets  $12\frac{1}{2}$  % below cost, I lose  $5\frac{1}{4}$  ct. a bu.: for how much do I sell them per bu.?
8. Sold a ferry-boat for \$10010, losing 23 % : what was the cost?
9. Goods were sold  $27\frac{1}{2}$  % above cost, by which \$154 was gained: what was the selling price?
10. Goods were sold for \$3010, by which 14 % was lost: find the loss.

11. By selling at \$2.25 a lb.,  $6\frac{1}{4}\%$  was lost: what % would have been gained by selling at \$2.50 a lb.?

12. If I sell 7 apples for what 5 cost, what % will I lose?

13. If I sell  $\frac{2}{3}$  of a farm for what  $\frac{4}{5}$  of it cost, what % do I gain?

14. By selling cloth at \$4 a yd., 28 % was gained: what % would be gained by selling at \$4.25 a yd.?

15. A had 50 bu. of wheat, costing \$1.12 a bu.; he sold  $\frac{2}{5}$  at a loss of 40 %, and the rest at a gain of 60 %: what % does he clear?

16. What % is gained by selling 14 oz. 1 dr. of sugar for a pound?

17. Having 27 bales of hemp, I sold 12 at \$18 a bale, and the balance at \$21.60 a bale, and cleared 35 %: what did the hemp cost?

18. What must be paid for 14 bu. of potatoes, so that 28 % may be gained by selling at 14 ct. a half-peck?

#### ARTICLE 250.—ASSESSMENT OF TAXES.

1. What % of tax must be levied on property worth \$2250000, to build a bridge costing \$27000?

2. A man owning real estate assessed at \$4300, and personal property at \$1940, and paying for 2 polls, at \$1 each, was taxed \$33.20: what was the % of tax?

3. A is worth \$7257; B, \$5732: the levy being 8 m. on \$1, how much more tax will A pay than B?

4. At  $8\frac{1}{2}$  m. on \$1, what tax must C pay, whose property is assessed at \$9360?

5. In a township whose assessed property is \$298500, a tax of \$3582 is to be levied: what is a man's tax whose property is worth \$2275?

#### ARTICLE 251.—AMERICAN DUTIES.

1. Find the duty, at 4 %, on 20 boxes, each containing 250 lb. of tobacco, costing 20 ct. a lb.; tare  $6\frac{1}{4}\%$ .

2. On 10 boxes of same, containing 500 lb. each.
3. On 5 boxes of same, containing 1000 lb. each.
4. On 3 boxes of tin, weighing 111, 112, and 113 lb. respectively, at 5 ct. a lb.; tare 5 %.

### ARTICLE 252.—PARTNERSHIP.

1. A contributes \$80, B \$70, C \$130; they lose \$154: what is the loss of each?

2. Divide \$80 into 4 parts, that shall be to each other as 6, 7, 9, and 10.

3. Three men load a ship: A furnishes 350 tuns; B, 450 tuns, and C, 550 tuns; in a storm 270 tuns are thrown overboard: what is the loss of each?

4. A man dying in 1860, his property was divided among his sons according to the years of their several ages: if he was worth \$18000, and the children were born in 1847, 1849, 1851, 1853, and 1855, respectively, what is the share of each?

5. Divide 225 into 2 parts in the ratio of 3 and  $4\frac{1}{2}$ .

6. Three men bought 640 A. of land: the first paid \$325.08; the second, \$406.35; the third \$568.89: how much land should each have?

7. A's stock is \$3000; B's \$4500; the gain \$1750: find the gain of each.

8. Jones put in \$1050 for 8 mon.; Brown, \$1200 for 6 mon.; they gain \$650: find the share of each.

9. A and B rent a pasture for \$50; on dividing, A's tract is 80 rods long and 60 rods wide, and B's 64 rd. long and 50 rd. wide: what should each pay?

10. C's capital is \$1800; D's, \$2400; C's is employed 8 mon., D's 5 mon.; they gain \$341: what is the share of each?

11. A school charter a boat for a pic-nic, price \$50; having but 210 to go, they receive on board another school of 140: what should the second school pay?



12. A furnishes 340 bu. of wheat at \$1.10 per bu.; B, 404 bu. of corn at 50 ct. per bu.; they gain \$31.68: find the gain of each.

13. Johnson contributed \$7500 for 1 year; Wilson \$8000 for 9 mon.; on dissolving, they had but \$11450: what was the loss of each?

14. Two men received \$51 for hauling; the first hauled 8 loads a da. for 10 da., hauling 6 bl. each time; the second hauled 9 loads of 5 bl. each, every da. for 12 da.: what must each receive?

15. A pastures 8 cows 3 wk. 2 da.; B, 12 cows 4 wk. 1 da.: what part should each pay?

16. Davis & Mills bought goods costing \$3025, of which Mills paid \$1089; they gain \$357.25: find the gain of each.

17. A man dying, bequeathed to his oldest son \$1500, to the second \$1250, and to the youngest \$475; but his property amounts to only \$2612.25: how should it be divided?

18. Three men bought a horse for \$100, and sold him for \$150, by which A gained \$18, and B \$19: how much had each paid for the horse?

19. Three men received \$13.22 for hauling iron: the first hauled 3 T. 4 cwt. 1 qr. 15 lb.; the second, 4 T. 19 cwt. 20 lb.; the third, 5 T. 3 qr. 5 lb.: how should they divide the money?

20. Divide 10.25 into two parts, which shall be to each other as  $1\frac{2}{3}$  to  $2\frac{1}{2}$ .

21. What two numbers are there whose sum is 96, and which are to each other as 7 to 9?

22. Divide 756 into two parts, which shall be to each other as 7.5 to  $\frac{3}{8}$ .

23. A put in \$1000 for 1 year; B put in \$1200 at first, but in 4 mon. drew out \$200: divide the year's gain, which was \$465, between them.

24. A had \$3000, B \$3500, which they invested in business, A for 12 months, B for 10 months; they gain \$2840: what was each then worth?

25. A invested \$675, B \$810, for the same time; A's share of the gain was \$125: what was the gain?

26. A commenced business with \$2500; two months after, B joined him with \$3000; 2 years after commencement, they had cleared \$2835: how must they divide this gain?

27. A, B, and C began business with \$1000 each: A's money was in 10 mon., B's 12 mon., C's 14 mon.; they sold their store, etc., for \$2730: find the loss of each.

### ARTICLE 256.—EQUATION OF PAYMENTS.

1. Jones buys \$1600 worth of goods; \$300 at 4 mon., \$600 at 5 mon., the rest at 10 mon.: what was the mean time of payment?

2. Goods were sold as follows: \$200 at 8 mon., and \$300 at 10 mon.: find the mean time.

3. \$1200 is due as follows: \$240 in 5 mon., \$480 in 8 mon., balance in 1 yr.: what is the mean time?

4. \$600 is due now, \$1200 in 6 mon., \$1200 in 9 mon.: required the equated time of payment.

5. \$300 is due in 14 days, and \$6000 in 35 days: at what time should both be paid?

6. \$500 is due May 4th, and \$500 May 26th: when should both be paid?

7. \$900 was due Jan. 12, \$1000 July 12, and \$1100 Sept. 12: it is desired to pay them together: when should it be done?

8. Exchanged my notes of \$500 at 4 mon., \$600 at 5 mon., and \$400 at 7 mon., with a merchant for one note of \$1500: how long should his note run?

9. May 1, I paid \$300, July 12, \$700, and Sept. 22, \$800: when might I have paid them all together? (Count days.)

10. Bought goods as follows: Jan. 15, \$30; Jan. 27, \$80; Feb. 8, \$70; Feb. 24, \$60: find the equated time.

11. A owes \$900, due in 8 mon.: if he pays \$300 now, when should he pay the balance?

12. Instead of paying \$50 on the first day of each mon. of the yr., when should the whole \$600 be paid at one payment?

#### ARTICLE 260.—ALLIGATION MEDIAL.

1. Mix 30 lb. of coffee, at 16 ct. a lb., with 20 lb. at 21 ct. a lb., and find the value of 1 lb. of the mixture.

2. 40 gal. of wine, at \$4.32 a gal., was diluted with 5 gal. of water: what is 1 gal. now worth?

3. A man has 3 cows, worth \$33 each, 4 oxen worth \$42 each, and 2 horses worth \$96 each: what is the average value?

4. 8 bells were cast, 3 of 1 T. 2 cwt. 1 qr. each; 2 of 19 cwt. 20 lb. each; 2 of 13 cwt. 3 qr. 22 lb. each, and 1 of 11 cwt. 23 lb.: find the average weight.

5. A steamboat went 14 mi. 3 fur. 8 rd. per hour, for 10 hr.; then 10 mi. 4 rd. per hour, for 8 hr.: what was the average speed?

6. A student calculated the latitude of Cincinnati from six observations, as follows:  $39^{\circ} 5' 50''$ ,  $39^{\circ} 6' 8''$ ,  $39^{\circ} 6' 1''$ ,  $39^{\circ} 5' 58''$ ,  $39^{\circ} 6' 10''$ , and  $39^{\circ} 5' 59''$ : what was the average?

7. A man builds 2 rd. of wall in 7 hr. 34 min., and at another time  $2\frac{1}{2}$  rd. in 8 hr. 17 min.: find the average time of building 1 rod.

8. A company of soldiers procured uniforms; in 23 there were 7 yd. 2 qr. 3 na. each; in 31, 8 yd. 1 qr. 1 na. each; in 22, 8 yd. 2 qr. each; in 23, 8 yd. 3 na. each, and in 1, 8 yd. 3 qr. 3 na.: what was the average quantity in each uniform?

9. What is the average price of 7 articles, 5 at \$1 each, the others at 2 ct. each?

10. A man mixed 4 gal. of alcohol at 50 ct. a gal., 2 qt. of ether at 80 ct. a qt., and 1 gal. of water: what was the mixture worth per gal.?

## ARTICLE 268.—EXCHANGE OF CURRENCIES.

1. Reduce £28 2s. 6d. to U. S. money.
2. Reduce \$246.477 to sterling money.
3. Reduce \$242 to sterling money.
4. Reduce 960 d. to U. S. money.
5. Reduce \$200 to sterling money.
6. Reduce \$2222 to sterling money.
7. Reduce £300 3 d. to U. S. money.
8. Reduce \$482.79 to sterling money.
9. Find the value of a note for £100, at 10 % premium. (Art. 272.)
10. Of £44 4s. 4d., at 9 % premium.
11. What bill of exchange can be bought for \$109, at 9 % premium?
12. What for \$400, at 10 % premium?
13. What cost a draft for £90 10s., at 10 % premium?
14. Reduce £50 New York currency, to U. S. money. (Art. 273.)
15. Reduce \$271.50 to Pennsylvania currency.
16. Reduce £19 9s. 6d., N. E. currency, to dollars.
17. Reduce £199 14s. 6d., Penn. currency, to dollars.
18. Reduce £88 1s. 8d., Georgia currency, to dollars.
19. Reduce £49 5s., Canada currency, to New York currency.

## ARTICLE 275.—DUODECIMALS.

1. 19 ft. 4" — 9 ft. 4' = what?
2. 6' 9"  $\times$  5' 4" = what?
3. What is the surface of a square frame 6 ft. 8 in. long, and 2 ft. 3 in. wide?
4. 10 in. 8"  $\times$  11 in. 3"  $\times$  6' 7" = what?

*Test Examples.—8.*

5. How many cu. feet in a block 3 ft. 6 in. 8" long, 1 ft. 1 in. 3" high, and 1 ft. 3 in. 9" wide?

6. 7 ft. 2 in. 6"  $\times$  4 ft. 5 in. 2" = what?

### ARTICLE 279.—INVOLUTION.

- |                                      |                                      |
|--------------------------------------|--------------------------------------|
| 1. What the square of 72?            | 8. Second power of 10.05?            |
| 2. Third power of 111?               | 9. Second power of $40\frac{1}{3}$ ? |
| 3. Fourth power of 15?               | 10. Third power of 21.2?             |
| 4. Fourth power of .07?              | 11. Fifth power of 1.4?              |
| 5. Square of $\frac{14}{27}$ ?       | 12. Fifth power of $1\frac{5}{6}$ ?  |
| 6. Third power of $\frac{12}{17}$ ?  | 13. Sixth power of 1.01?             |
| 7. Fourth power of $\frac{10}{13}$ ? | 14. Sixth power of $1\frac{2}{3}$ ?  |

#### *Find the Square*

- |               |                         |                           |
|---------------|-------------------------|---------------------------|
| 15. Of 831.   | 17. Of $\frac{7}{30}$ . | 19. Of $1\frac{7}{30}$ .  |
| 16. Of 42.01. | 18. Of 100.01.          | 20. Of $22\frac{1}{22}$ . |

#### *Find the Cube*

- |                          |                          |                           |
|--------------------------|--------------------------|---------------------------|
| 21. Of 29.4.             | 23. Of 40.5.             | 25. Of 37.8.              |
| 22. Of $14\frac{1}{3}$ . | 24. Of $10\frac{1}{3}$ . | 26. Of $11\frac{1}{11}$ . |

#### *Find the Fourth Power*

- |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| 27. Of 151.              | 29. Of 100.1.            | 31. Of 88.8.             |
| 28. Of $12\frac{5}{6}$ . | 30. Of $19\frac{1}{4}$ . | 32. Of $10\frac{1}{3}$ . |

#### *Find the Fifth Power*

- |              |                          |             |
|--------------|--------------------------|-------------|
| 33. Of 12.5. | 34. Of $20\frac{5}{6}$ . | 35. Of 321. |
|--------------|--------------------------|-------------|

### EVOLUTION.

#### ARTICLE 287.—EXTRACTION OF THE SQUARE ROOT.

##### *Find the Square Root of*

- |          |            |              |
|----------|------------|--------------|
| 1. 441.  | 4. 40401.  | 7. 345744.   |
| 2. 1444. | 5. 419904. | 8. 30858025. |
| 3. 7744. | 6. 210681. | 9. 8.1225.   |



10. 25.4016.	14. 640160.01.	18. 13.5.
11. 100.8016.	15. $2\frac{5}{3}6\frac{6}{1}$ .	19. 99.9.
12. .000025.	16. $136\frac{1}{9}$ .	20. $199\frac{3}{25}$ .
13. 630.01.	17. $\frac{3}{5}$ .	21. 87627.

22. What is the side of a square field containing 1 A. 9 P.?

23. How long is the side of a chess-board, whose surface is 2 sq. ft. 1 sq. in.?

24. How large a square court can be paved with 162 tiles, each containing 72 sq. in.?

25. If an army of 95481 were arranged in a square, how many men would there be in each rank and file?

26. A square play-ground contains  $2\frac{1}{5}$  acres: what is the length of each side? (Reduce to P.)

#### ARTICLE 288.—SQUARE ROOT BY FACTORING.

*By factoring find the Square Root*

1. Of 625.	3. Of 4096.	5. Of $49 \times 169$ .
2. Of 2916.	4. Of 484.	6. Of $49 \times 64$ .
7. Of $8 \times 50$ .	8. Of $75 \times 125 \times 375$ .	

#### ARTICLE 290.—APPLICATIONS OF SQUARE ROOT.

1. In a right-angled triangle, the base is 120, perpendicular 50: find the hypotenuse.

2. The hypotenuse 34 ft., the perpendicular 16 ft.: what the base?

3. A tent pole 70 ft. high stands in the center of a circular ring 48 ft. in diameter: what length of rope will reach from the top of the pole to the edge of the ring?

4. A tree 90 feet high was broken 25 feet from the bottom: how far from the base did the top strike the ground?

5. A fort 20 ft. high is surrounded by a ditch 21 ft. wide: what must be the length of a ladder reaching from the top of the wall to the outer edge of the ditch?

6. The rafters of a house are 13 ft. long on each side, and rise 5 ft. in the middle: how wide is the house?

7. Base and perpendicular, each 50: find the hypotenuse.

8. Hypotenuse 50; base and perpendicular equal: find them.

9. How wide must a man make a doorway 7 ft. high, so that a circular saw 8 ft. in diameter will pass through?

### ARTICLE 291.

1. A rectangular field is 75 rd. long and 48 rd. wide: what is the side of a square field of the same area?

2. How large a square field is equal to the difference between 32 A. and 40 A. 16 P.?

3. A traded a tract of land, 30 rd. square, with B, for a tract 40 rd. square, paying him \$140: how much was that per A.?

### ARTICLE 296.—CUBE ROOT.

*Find the Cube Root of*

1. 15625.	5. 195112.	9. 7762392.
2. 357911.	6. 24389.	10. .000729.
3. 185193.	7. 27270901.	11. 4.096.
4. 681472.	8. 111284641.	12. .438976.
13. .000025672375.	17. 973569 $\frac{187}{729}$ .	
14. $\frac{3375}{17576}$ .	18. 4.	
15. $11\frac{323}{343}$ .	19. 783.	
16. $1259\frac{89}{125}$ .	20. $8\frac{1}{7}$ .	

21. A crib of a cubical form contains 2197 cu. ft.: what is the length of each side?

22. A cubical reservoir contains 101 cu. yd. 17 cu. ft.: how long is each side?

23. A cistern contains 2048 cu. ft.: what is the side of a cubical cellar of twice the capacity?

24. A man has 8 vats of 729 cu. ft. each: what is the side of a cubical vat equal in capacity to the 8?

### ARTICLE 297.

1. A two-inch cube weighs 3 lb. 8 oz.: what is the weight of a three-inch cube of the same material?

2. A box measures 2 in. each way: how many times will its capacity be multiplied by increasing each side 1 in.?

### ARTICLE 298.—CUBE ROOT BY FACTORING.

1. Find the cube root of  $36 \times 49 \times 42$ .

2. Find the cube root of  $32 \times 48 \times 64 \times 72$ .

3. Find the cube root of  $10 \times 20 \times 25 \times 25 \times 64$ .

## ARITHMETICAL PROGRESSION.

### ARTICLE 301.—CASE I.

1. The first payment was \$50, the second \$53, the third \$56, and so on: what was the 19th payment?

2. First term of a series 94, second 92: find the 20th.

3. First term 43, com. dif.  $\frac{7}{12}$ : find the 37th term of an increasing series.

4. The first term 3, com. dif. 33: find the 10th term.

5. First term 3, com. dif. 10: find the 33d term.

6. First term 1 cwt. 1 qr. 17 lb., com. dif. 7 lb.: find the 15th term of an increasing series.

7. A reservoir commenced leaking, 5 gal. the first hour, 8 gal. the second, 11 gal. the third, and so on: what was the waste during the 13th hr.?

## ARTICLE 302.—CASE II.

1. The extremes are 8 and 155; the number of terms 8: find the common difference.

2. The first term is 555, the 20th 23: find the common difference.

## ARTICLE 303.

1. The first term is 337, the common difference is 24, the last term 49: find the number of terms.

## ARTICLE 304.—CASE III.

1. The extremes are 2 and 27; the number of terms 6: find the sum of the series.

2. The first term is 19, the second 22: find the sum of 12 terms.

3. Find the sum of 30 terms of the series 1, 4, 7, 10, etc.

4. A man gave a charitable association \$75 the first month, \$80 the second, and so on: how much did he give in 1 year?

5. If the profits of a store are \$939 the first month, and each succeeding month \$80 less than the preceding, find the profits in 1 yr.

## GEOMETRICAL PROGRESSION.

## ARTICLE 307.—CASE I.

1. The first term of an increasing geometric series is 7, the ratio 4: find the fourth term.

2. First term of a decreasing series is 12288, the ratio 4: find the seventh term.

3. Find the tenth term of the geometric series 1536, 768, etc.

4. A man traveled 96 mi. the first day, and on each succeeding day  $\frac{3}{4}$  as far as on the preceding day: how far did he go on the fifth day?

5. What is the seventh term of the series 128, 192, 288, etc.?

ARTICLE 308.—CASE II.

1. The first term of an increasing series is 2, the ratio 4: what is the sum of seven terms?

2. Find the sum of the infinite series  $\frac{1}{2}, \frac{1}{3}, \frac{2}{9}$ , etc.

3. A man sold 10 pieces of cloth, at 10 ct. for the first piece, 20 ct. for the second, 40 ct. for the third, and so on: what sum did he receive?

4. Find the sum of the infinite decreasing series, whose first term is 8, and ratio 2.

5. What is the sum of 8 terms of the series 4374, 1458, etc.?

6. Find the sum of the infinite decreasing series, of which the 1st term is  $\frac{27}{100}$ , and the ratio 100.

7. Find the sum of the infinite decreasing series, whose first term is .142857 and ratio 1000000.

ARTICLE 309.—PERMUTATIONS.

1. In how many different ways may the letters of the word "*number*" be written?

2. In how many, the letters of the word "*previous*"?

3. A man offered to buy 9 horses, paying 5 cents for every different order in which they could be brought out: how much would that be apiece?

MENSURATION.

ARTICLE 311.—AREA OF A PARALLELOGRAM, RECTANGLE, SQUARE, OR RHOMBUS.

*Find the superficial contents*

1. Of a field 60 rd. long, and 20 rd. wide

2. Of a plank 4 yd. long, and 8 in. wide.

3. Of a pavement 8 ft. 6 in. wide, and 25 ft. long.

4. Of a canal 50 ft. wide, and 8 miles long.



5. Of a roof, each side being 11 ft. wide, 36 ft. long.
6. Of a river 600 miles long, whose average width is 440 feet.
7. Of a park 660 ft. square.
8. A room is 12 ft. square: if each side were 3 ft. longer, how much larger would the floor be?
9. How many blocks 2 in. square will cover the same space as 8 blocks 5 in. square?
10. A floor 12 ft. wide requires 20 sq. yd. of carpeting: how long is the floor?
11. How many acres in a square field, each side of which is 2 fur. long?
12. A man was 3 days, of 10 hours each, in painting a wall 8 ft. high: if he can paint 4 sq. yd. per hour, how long was the wall?
13. What is the side of a square equal in extent to a rectangle 32 rd. by 72 rd.?

ARTICLE 312.—PLASTERERS', PAVERS', PAINTERS', AND CARPENTERS' WORK.

1. At 20 ct. a sq. yd., what must be paid for painting the *two sides* of a wall 40 ft. long, and 5 ft. 3 in. high?
2. A man has a yard 38 ft. long and 27 ft. wide; he reserves 2 grass plats each 8 ft. square, and has the rest paved with stone at 45 ct. a sq. yd.: what did it cost?
3. At 20 ct. a sq. yd., what will it cost to paper the side-walls of a room 26 ft. long, 22 ft. wide, and 10 ft. 6 in. high?
4. Find the number of sq. yd. of plastering in a room 20 ft. long, 14 ft. wide, and 10 ft. high; deducting three windows each 7 ft. by 3 ft. 6 in., 2 doors each 8 ft. by 3 ft. 3 in., and a fireplace 4 ft. by 5 ft.
5. What cost the plastering of a room 15 ft. long, 14 ft. wide, and 9 ft. high, at 21 ct. a sq. yd.; deducting a fireplace 4 ft. by 5 ft., 4 windows each 3 ft. by 6 ft. 10 in., and 2 doors each 2 ft. 9 in. by 6 ft. 6 in.?

**ARTICLE 313.—TO FIND THE AREA OF A TRIANGLE.**

1. Find the area of a triangle, whose sides are 30 ft., 40 ft., and 50 ft., respectively.
2. Find the contents of a triangle, whose base is 40 ft., and perpendicular height 30 ft.
3. What is the value of a triangular field, whose sides are 26, 28, and 30 rd. respectively, at \$12.80 an A.?
4. Find the area of a triangle, whose sides are 36, 48, and 60 feet.
5. Of a triangle, whose sides are 18, 80, and 82 feet.
6. Find the area of a right-angled triangle, whose base is 40 rd., and perpendicular 20 rd.
7. A triangle containing 80 sq. yd. has a base 30 ft. long: what is the perpendicular height?

**ARTICLE 314.—TO FIND THE AREA OF A TRAPEZOID.**

1. Find the area of a trapezoid, whose parallel sides measure 70 ft. and 90 ft., and are 40 ft. apart.
2. A trapezoid is 1 fur. wide, and the parallel sides measure 2 fur. and 3 fur.: find the area.

**ARTICLE 315.—GIVEN, THE DIAMETER OF A CIRCLE,  
TO FIND THE CIRCUMFERENCE.**

1. The diameter is 19 rods: find the circumference.
2. A wheel is 14.5 ft. in diameter: what is its circumference?
3. The front wheels of a carriage are 4 ft. 10 in. in diameter, the hind ones 5 ft. 5 in.: what is the difference in the circumference of the two?
4. What length of tire would be required for the 4 wheels of such a carriage?

ARTICLE 316.—GIVEN, THE CIRCUMFERENCE, TO FIND THE DIAMETER.

1. The circumference of a circle is 109.956 ft.: what is the diameter?
2. A circular lake is 358 ft. in circumference: what is the diameter?
3. Wishing to ascertain the diameter of a circular fish-pond, I measured the circumference, which was 785 yd. 1 ft. 2.4 in.: what was the distance across the center?

ARTICLE 317.—TO FIND THE AREA OF A CIRCLE.

1. The radius of a circle is 30 ft.: find the area.
2. The diameter of a circle is 16 rd.: find the area.
3. What cost a circular plat of ground, whose radius is 60 rd., at \$25 an acre?

ARTICLE 318.—AREA GIVEN, TO FIND THE DIAMETER.

1. What is the diameter of a circle, whose area is 19.635 sq. ft.?
2. Find the radius of a circle, whose area is 1256.64 sq. ft.
3. What is the radius of a circular field, equal in area to a right-angled triangle, whose base is 40 rd. and perpendicular 30 rd.?

ARTICLE 320.—TO FIND THE SOLID CONTENTS OF A PARALLELOPIPED.

1. Required the solid contents of a parallelopiped 10 ft. 6 in. long, 4 ft. wide, and 1 ft. 8 in. thick.
2. Of a rectangular piece of timber 40 ft. long, 2 ft. 2 in. wide, and 9 in. thick.
3. Of a cellar 30 ft. long, 7 ft. 6 in. deep, and 15 ft. 5 in. wide.

4. In a bu. there are 2150.4 cu. in.: how many bu. will fill a bin 13 ft. 4 in. long, 4 ft. 8 in. wide, and 4 ft. 6 in. high?

5. Eight stone window-sills, each 4 ft. long, 4 in. thick, and 6 in. wide, cost 60 ct. a cubic foot: what was paid for the 8?

ARTICLE 321.—MASONS' AND BRICKLAYERS' WORK.

1. How many perches in a wall 80 ft. long, 11 ft. 3 in. high, and 2 ft. 9 in. thick?

2. In a pier 300 ft. long, 18 ft. 4 in. high, and 4 ft. 6 in. thick?

3. In a breakwater 1 mi. long, 18 ft. high, and 12 ft. thick?

4. What cost a wall whose length is 1 fur., height 1 rd., thickness 1 ft., at \$3.25 a perch?

ARTICLE 322.—TO FIND THE SOLID CONTENTS OF A PRISM, OR OF A CYLINDER.

1. A prism 14 ft. high stands on a base 4 ft. square: what will be the solid contents?

2. Find the solid contents of a cylinder 8 ft. high, whose base is 1 ft. in diameter.

3. A prism 18 ft. high, has for its base a trapezoid, whose parallel sides are 18 and 22 ft., and the perpendicular distance between them 11 ft.: what will be the solid contents?

4. The sides of the base of a triangular prism are 3 ft. 3 in., 3 ft. 6 in., and 3 ft. 9 in.; the height is 6 ft.: required the solid contents.

5. How many bu. in a cylindrical box 6 ft. high, and 4 ft. in diameter?

6. What is the difference in the contents of two rectangular prisms, the first 5 ft. high, on a base 4 ft. square; the second 4 ft. high, on a base 5 ft. square?

ARTICLE 323.—TO FIND THE CONTENTS OF A PYRAMID, OR OF A CONE.

1. What will be the solid contents of a cone, whose perpendicular hight is 18 in. and the base 10 in. in diameter?

2. Find the contents of a pyramid 12 ft. high, and whose base is a triangle having its sides  $2\frac{1}{2}$ , 6, and  $6\frac{1}{2}$  ft. long.

3. Find the contents of a cone 6 ft. high, whose base has a radius of 5 ft.

ARTICLE 324.—TO FIND THE SOLID CONTENTS OF THE FRUSTUM OF A PYRAMID, OR OF A CONE.

1. Find the contents of the frustum of a pyramid, the area of the upper base being 10 sq. ft., of the lower base 40 sq. ft., the altitude 15 ft.

2. Find the contents of the frustum of a square pyramid, the lower base being 9 in. square, the upper 6 in. square, the hight 7 in.

3. A drinking cup is 3 in. in diameter at the bottom, 5 in. at the top, and 6 in. high: find the contents.

ARTICLE 325.—TO FIND THE SOLID CONTENTS OF A GLOBE.

1. What is the solidity of a globe, whose diameter is 16 in.?

2. Of a globe whose radius is 1 foot 8 inches?

ARTICLE 326.—TO FIND THE AREA OF THE SURFACE OF A BODY.

1. Each side of the base of a triangular pyramid is 2 ft. 4 in.; the slant hight 6 ft.: what is the area of the sides?

2. What is the convex surface of a cone, whose slant hight is 8 in., the radius of the base 10 in.?

3. What is the surface of a parallelopiped 8 ft. long, 4 ft. wide, and 2 ft. high?



4. Find the surface of a globe, whose radius is 11 in.

5. Find the area of the sides of the frustum of a pyramid, the lower base being 5 ft. square, the upper base 4 ft. square, and the slant height 7 ft. .

### ARTICLE 327.—GAUGING.

1. How many wine gallons in a box 8 ft. long, 2 ft. wide, and 3 ft. high?

2. How many beer gal. (Note, Art. 96.) in a vessel 6 ft. long, 4 ft. wide, and 4 ft. high?

3. How many gal. of ale will fill a tank 5 ft. long, 3 ft. 11 in. wide, and 2 ft. deep?

### ARTICLES 328 AND 329.—TO FIND THE CONTENTS OF A CISTERN.

1. How many barrels in a cistern 8 ft. in diameter, and 10 ft. deep?

2. How many barrels in a cistern 10 ft. in diameter, and 8 ft. deep?

3. How many gal. in a cistern 7 ft. deep, the upper diameter 3 ft. : the lower diameter, 4 ft.?

4. How many beer gal. in a cistern 4 ft. deep, the upper diameter 2 ft., the lower 2 ft. 3 in.?

5. How many bl. in a cistern the upper diameter 6 ft., the lower 5 ft., the depth 5 ft. 3 in.?

### ARTICLE 330<sup>a</sup>.—TO FIND THE CONTENTS OF A CASK OR BARREL.

1. How many gal. in a cask, the staves nearly straight, and the head diameter 35 in., bung diameter 36.5 in., length 50 in.?

2. Find the contents of a cask, the head diameter 30 in., the bung diameter 39 in., the length 35 in.

3. Head diameter 39.4 in., bung diameter 40.4 in., length 60 in. : what the contents?

## ARTICLE 332.—PROMISCUOUS EXAMPLES.

1. A had \$29 less than B, and \$65 more than C: if C has \$337, how much has B?

2. Bought stock at 8 % discount, and sold at par, gaining \$320: what did the stock cost me?

3. Bought stock at par, and sold at 8 % premium, gaining \$248: what did the stock cost me?

4. The sum of three fractions is  $2\frac{1}{3}$ : if the first is  $\frac{7}{8}$ , and the second  $\frac{5}{6}$ , what is the third?

5. What % of  $\frac{3}{4}$  is  $\frac{2}{3}$ ?

6. Divide \$370 among 3 men, so that A may have \$34 more than B or C.

7. A can build a wall in  $18\frac{3}{4}$  da., B in  $31\frac{1}{4}$  da.: how long would it take both together?

8. Stock at  $4\frac{1}{2}$  % premium is worth \$2508: what is the par value?

9. A was born Aug. 19, 1828; James is 3 yr. 7 mon. 24 da. older: what was James's birthday?

10. At \$5.75 an A., what is the value of a field 3 fur. square?

11. At \$30 a P., what is the value of a strip 20 yd. long, and 20 ft. wide?

12. What is the interest of \$375, for 3 yr. 3 mon. 3 da., at 3 %?

13. Complete the proportion of which the first, second, and third terms are  $3\frac{3}{4}$ ,  $8\frac{1}{2}$ , and 7.8.

14. A man, by paying a note 20 days before maturity, saved \$7.23 interest: what was the face, interest 6 %?

15. A can do a piece of work in  $10\frac{1}{2}$  da., A and B together in  $3\frac{1}{2}$  da.: how long would it require B alone?

16. A merchant buys goods as follows: \$480 cash, \$320 at 3 mon., \$500 at 4 mon., \$300 at 6 mon., and \$400 at  $5\frac{3}{5}$  mon.: what is the equated time of paying all together?

17. Paid \$39 for insuring a house worth \$4550, at  $1\frac{1}{3}\%$ : what part of the value was insured?

18. A can do a piece of work in  $\frac{1}{4}$  da., B. in 5 da.: how long would it require both?

19. Having \$9900 in gold, what difference would there be between selling the gold at 1% premium for bills, and buying bills at 1% discount for gold?

20. How many bl. of molasses (40 gal. each) must be bought for \$688, so that 5% may be gained by selling it at 42 ct. per gal.?

21. How much water must be added to a bl. of wine, costing \$100, so that it may be worth  $31\frac{1}{4}$  ct. a pt.?

22. If a man wishes to have a sum amount to \$910 in 5 yr., how much more must he lend at 6%, than at 8%?

23. By selling at 33 ct. a pound, twice as much is gained as by selling at 29 ct. a lb.: what % is gained by selling at 32 ct. a lb.?

24. What date is 7 mon. 15 da. before July 15, 1861?

25. If 15 men in 12 da. of 10 hr. each, can dig 25 cellars, each 30 ft. long, 14 ft. wide, and 8 ft. deep, how many hr. a day must 42 men work for 9 da., to dig 30 cellars, each 49 ft. long, 16 ft. wide, and 9 ft. 9 in. deep?

26. The amount of a certain principal, at 10% for 3 yr., at simple interest, was \$520: find the amount of the same principal, at compound interest, for the same time and at the same rate.

27. The product of two equal factors is 34225: what is each factor?

28. What will 2 cwt. 12 lb. 5 oz. 5 dr. of tea cost, at 68 ct. a lb.?

29. What sum must be divided among C, D, and E, so that D may have \$800 more than C, and E  $\frac{3}{4}$  as much as C, or  $\frac{2}{5}$  as much as D?

30. Two men are 90 mi. apart, and travel toward each other, A starting 1 hr. before B; A goes 9 mi. in 2 hr.,

B 11 mi. in 4 hr.: how far will each travel before they meet?

31. \$387.50 was paid on settlement, of which \$77.50 was interest: how long had the account been running? (Int. 9 %.)

32. If 7 lb. of coffee are worth 2 lb. of tea, and 3 lb. of tea are worth 11 lb. of sugar, what cost  $19\frac{1}{4}$  lb. of sugar, if  $4\frac{1}{2}$  lb. of coffee cost 48 ct.?

33. If 2 oz. of silver, worth \$1.10 an oz., are melted with 2 oz. of gold, worth 94 ct. a pwt., what is the compound worth per oz.?

34. The bank discount, at 6 %, of a note having 2 mon. to run, was \$72.66: find the face.

35. A put in \$320 for 5 mon., B \$360 for 6 mon., C \$480 for 8 mon.; A gained \$520: find the gain of B and C.

36. If a certain number be diminished by its one-eighth, and  $\frac{2}{3}$  of the remainder be added to the first number, the sum will be 18.24: required the number.

37. What is the equated time of the following debts: \$180 due in 4 mon., \$540 due in 7 mon., and \$280 due in 10 mon.?

38. What must be paid for a draft on London for £256 10 s., at 10 % premium?

39. If  $\frac{1}{3}$  of a number be subtracted from half the number, the remainder will be 6 less than  $\frac{1}{5}$  of the number: what is the number?

40. The true discount of a debt due in 3 yr. was \$27.90: find the debt. (6 %.)

41. The time past noon is  $\frac{5}{11}$  of the time to midnight: find the time.

42. The time past noon is  $\frac{5}{11}$  of the time past midnight: find the time.

43. Find the bank discount of a note of \$825.20, payable in 3 mon. (6 %.)



44. A globe 6 in. in diameter weighs 64 lb.: what will be the weight of another globe of the same material, the diameter being 1 ft. 9 in.?

45. Find the interest of \$327.20, from May 20, 1851, to March 25, 1858, at 9 %.

46. What is the area of a circle whose diameter is 3 rd. 3 yd.?

47. Add together the cubes of 33, 44, and 55, and extract the cube root of the result.

48. Mix  $2\frac{1}{4}$  pt. at 37 ct. a pt., with 7 pt. at 74 ct., and find the value of 1 pt. of the mixture.

49. What is the present worth of a debt of \$700, due in 4 yr. 5 mon. 10 da., reckoning money worth 9 %?

50. Bought 30 yd. of cloth, said to be 1 yd. wide, at \$3.25 a yd.: what is my loss, the width being only 3 qr. 2 na.?

51. Find the 20th term of the series 2, 4, 6, etc.

52. The 8th term of the series 2, 4, 8, etc.

53. Divide \$5000 between A and B, so that A's share may be \$400 less than twice B's.

54. A bank deducted \$27.30 in discounting a note for \$2600, payable in 60 days: what rate % was that?

55. What cost 23 A. 3 R. 39 P. of land, at \$72 per A.?

56. Lent a man \$630 for 7 yr. 9 mon. 10 da., and received, on settlement, \$1071: find the rate.

57. A man can do a piece of work in 45 da.: if his son can work  $\frac{2}{3}$  as fast, how long would it take both to do it?

58. Sold for a man 320 A. of land, at \$2.56 $\frac{1}{4}$  per A., and sent him \$779: what % commission did I charge?

59. If a man buy apples at the rate of 4 for 5 ct., what % will he gain or lose, by selling 5 for 6 ct.?

60. A and B, dividing a lot of marbles, A had 35 more than  $\frac{1}{2}$ , and B 35 more than  $\frac{1}{3}$ : how many had each?

*Test Examples.—9.*



61. A man who owed a debt of \$389 due in 5 yr. 11 mon. 6 da., paid \$300 for it: what rate % was that?

62. The base of a triangle is 136, the altitude 17: find the side of a square equal in area.

63. A room is 14 ft. wide, 16 ft. long, and 8 ft. high: how many yd. of paper, 2 ft. wide, will be required to cover the walls?

64. A has  $\$7\frac{1}{2}$ , B  $\$8\frac{1}{4}$ : they buy oranges, and, on division, B has 15 more than A: how many do they buy?

65. A bank gave \$1385.30 for a note payable in 60 da.: how much did they charge for discounting at 6 %?

66. I gave A  $\frac{11}{152}$  of my money, and B  $\frac{1}{12}$  of the remainder: if B received 18 ct. more than A, how much had I at first?

67. The difference of longitude between Cincinnati and London is  $84^{\circ} 20'$ : at a certain time, it was as much past noon in London as it lacked of noon at Cincinnati: what time was it then at Cincinnati?

68. What sum must I lend for 5 yr. 6 mon., at 8 %, to receive on settlement \$957.24?

69. What number is that whose eighth exceeds its tenth, by 14 less than its twelfth?

70.  $27\frac{1}{2}$  is  $17\frac{1}{2}$  % of what number?

71. What cost 4 lb. 5 oz. 6 pwt. 16 gr. of silver, at \$12.60 a lb.?

72. A debt of \$563.75 is now worth \$440, counting money at 5 %: how long before it is due?

73. Find the area of a triangle whose sides are 10,  $10\frac{1}{2}$ , and  $14\frac{1}{2}$ .

74. A horse is fastened to a stake by a rope 100 ft. long: over how much ground can he graze?

75. For a note of \$800, payable in 42 da., I received in bank \$792: required the rate.

76. To a certain number its fifth was added, and one-fifth of the result being added to the original number, gave 6076: find the number.

77. A can do a piece of work in 6 da., A and B in  $3\frac{2}{7}$  da., and A, B, and C in  $2\frac{2}{3}$  da.: how long would it take A and C to do it?

78. Principal \$336, rate 10 %, amount \$560: find the time.

79. Hypotenuse 9 ft. 3 in., base 3 ft.: find the perpendicular.

80. What cost 99 yd. 3 qr. 3 na. of cloth, at \$5.60 per yard?

81. Paid \$17.25 for insuring  $\frac{3}{5}$  of a house, at  $1\frac{1}{4}$  %: required the value of the house.

82. A horse costing \$156.25, was sold for \$256.25: what % was gained?

83. The parallel sides of a trapezoid are  $37\frac{1}{2}$  ft. and  $38\frac{1}{2}$  ft., and are  $16\frac{1}{2}$  ft. apart: find the area.

84. Debt \$245, discount \$105, rate 8 %: find the time.

85. Area of a circle 19.635 sq. ft.: find the radius.

86. If 3 gal. of brandy, at \$3 a gal., and 5 qt. of alcohol, at 40 ct. a gal., be mixed with  $\frac{1}{2}$  gal. of water, for what must the mixture be sold per gal., to gain 37 %?

87. Find the sum of 15 terms of the series 7, 11, 15, etc.

88. The bank deducted \$33.20, and paid \$2366.80 for a note discounted at 6 %: how long had it to run?

89. A cistern has three pipes: the first will empty it in 9 hours; the other two are equal to each other in size; if all three are left open, the cistern will be filled in 6 hours: how long would it take the second or third alone to fill it?

90. How much water must be mixed with 80 gal. of wine, at \$1.35 a gal., to reduce the value 15 ct. a gal.?

91. For what principal must I pay \$506.64 interest, for 4 yr. 9 mon. 18 da., at 5 %?

92. A man bought copper at 27 ct. a lb.; it lost 2 % in casting: at what price per lb. must he sell the castings to gain 47 % ?

93. From a piece of ground 30 rd. wide, and 50 rd. long, a lot 25 ft. wide and 100 ft. long was sold for \$275: find the value of the remainder, at that rate.

94. Divide \$2331 among A, B, and C, in the ratio of  $\frac{1}{4}$ ,  $\frac{1}{5}$ , and  $\frac{1}{6}$ .

95. Find the curved surface of a right cone, whose slant height is 10 ft., and the radius of the base 5 ft.

96. There is a park 400 ft. square: if a walk 3 ft. wide is made *in it*, along the edges, how many sq. yd. would such walk contain?

97. What is the present worth of a debt due in 4 yr. 8 mon. 10 da., the true discount, at 6 %, being \$169?

98. What number is that whose square is  $22\frac{2}{9}$  % of the cube of 8?

99. A man has 50 gal. of wine, worth 90 ct. a gal., composed of a mixture of two kinds, worth, respectively, 70 ct. and \$1.20 per gal.: how many gal. of each kind in the mixture?

100. At what time between 5 and 6 o'clock is the minute hand 14 min. behind the hour hand?

101. The bank discount of a note of \$750 was \$8.50: what was the time? (Int. 8 %.)

102. Find the sum of 10 terms of the geometric series 3, 6, etc.

103. Find the sum of 10 terms of the arithmetical series 3, 6, etc.

104. A, B, and C bought a farm for \$21250, of which A paid \$712 more than B, and \$3551 less than C: what sum did each pay?

105. Find the solid contents of a globe, whose diameter is 1 ft. 3 in.

106. If January 1st is Sunday, how much can a man earn in the first three months of a leap year, at \$1.25 per day?

107. The true discount of a debt of \$405, due in 10 mon. 20 da., is \$30: what is the rate %?

108. Find two numbers whose difference equals 1427, and  $\frac{2}{3}$  of the first equal  $\frac{3}{4}$  of the second.

109. In what ratio must I mix coffee at  $10\frac{1}{2}$  ct. a lb., with coffee at 16 ct. a lb., so that the mixture may be worth 14 ct. a lb.?

110. A bank discounting a note payable in 57 da., paid \$396, the discount being \$4: what was the rate of discount?

111. Find the radius of a circle, whose circumference is 10 ft.

112. What % will be gained by buying apples at the rate of 3 for 1 ct., and selling them at 3 ct. each?

113. The discount on a debt due in 2 yr. was \$45: what would have been the discount on the same note, 10 mon. before due? (6 %.)

114. Find the rent of a house from Jan. 1, 1858, to Oct. 25, 1860, at \$375 per year.

115. What is the curved surface of a right cone, whose base is 4 ft. in diameter, the slant height being 5 ft.?

116. By selling at \$2 per lb., I lose 20 %: at what price per lb. must I sell to lose 30 %?

117. The present worth of a debt is \$660, which is \$213.40 less than the debt: how long before the debt is due?

118. What is the area of a circle, whose diameter is 1 ft. 1 in.?

119. If to a certain number its half be added, and the sum subtracted from 1000, the remainder will be 10 greater than the number itself: what is the number?

120. For a note of \$340, discounted at 6 %, a bank paid \$336.43: how many days had the note to run?

121. A prism is 6 ft. 4 in. high, on a base 3 ft. 9 in. square: find the solidity.



122. A owes \$1000, payable in 10 mon.: if he pay \$800 at the end of 8 mon., how long after the expiration of the 10 mon. should he keep the balance?

123. The square root of a certain number is 4096: what is the cube root of the same number?

124. How many pencils must be bought for \$1, so that 20 % may be gained by selling them 4 for 1 ct.?

125. The area of a right-angled triangle is 30 sq. ft., the base 12 ft.: find the hypotenuse.

126. By selling at \$3 a lb., 20 % was gained: what % would be gained at \$6 a lb.?

127. A horse was tied by a rope 52 ft. long, fastened to the top of a stake 20 ft. high: over what area can he graze?

128. The true discount is \$114.24, the present worth \$326.40, time 7 yr. 9 mon. 10 da.: find the rate.

129. Take the whole numbers under ten, add their cubes, and extract the square root of the sum.

130. The first term of an arithmetical series is 17, the common difference 6, the last term 161: how many terms are there?

131. How many yards of carpet, 3 qr. 2 na. wide, will be required to cover a floor 15 ft. 9 in. wide, and 16 ft. 6 in. long?

132. Sold a horse for \$37.05, losing 81 %: what was the loss?

133. Interest \$67.50, amount \$217.50, time 5 yr. 7 mon. 15 da.: required the rate.

134. A man having oranges at 4 ct. each, and apples at 2 for 1 ct., gained 20 % by selling 5 dozen for \$2.04: how many of each did he sell?

135. The 3 sides of a triangle are 16, 63, and 65: find the area.

136. What is the time at a place in west longitude  $31^{\circ} 27' 30''$ , when it is 2 min. after 2 P. M. at a second place in east long.  $2^{\circ} 30''$ ?



137. What debt due in 4 yr. 5 mon. 10 da., is now worth \$325.50? (9 %.)

138. Bought some lemons for \$7.20; had I received 30 more, each would have cost  $\frac{3}{4}$  as much: how many did I buy?

139. Find the area of a trapezoid, whose parallel sides are 1 fur. 2 rd., and 2 fur. 1 rd., and are 1100 ft. apart.

140. A man gave  $\frac{2}{5}$  of an estate to A,  $\frac{3}{4}$  of the remainder to B, and the balance to C, who received \$685 less than A: required the value of the estate.

141. The time since noon is  $\frac{7}{17}$  of the time to 4 o'clock, P. M.: what is the time?

142. The bank discount of a certain sum for 6 mon. was \$188.49: what would have been the true discount?

143. How much sherry wine at 70 ct. a gal. must be mixed with 20 gal. of port wine at \$1 a gal., and 30 gal. of Madeira wine at \$1.20 a gal., to make a mixture worth 90 ct. a gal.?

144. What is the area of a circle whose circumference is 47.124 ft.?

145. At \$1.47 a bu., what cost 17 bu. 3 pk. 2 qt. 1 pt. of fruit?

146. The base of a right-angled triangle is 42 ft., the hypotenuse 58 ft.: find the area.

147. To carry 7 T. 10 cwt. 25 miles costs \$18.75: how much can be carried 125 miles for \$131.25?

148. A man sold a house at 22 % loss, losing \$748: what did he receive for it?

149. What debt due in 4 mon., together with \$600, due in 9 mon., could be paid in 7 mon., without loss to either?

150. At 10 % premium, what bill of exchange on London can be bought for \$330?

151. What is the sum of 10 terms of the arithmetical series, whose first term is 7, and fourth term 19?

152. After 5 gal. of water had been added to 45 gal. of pure wine, the mixture was worth \$1.26 per gal.: what was the pure wine worth per gal.?

153. Find the solidity of a cylinder 7 ft. high, with a base 11 in. in diameter.

154. A owes B \$2500 due in 6 mon.; B wishes him to pay part now, and retain the remainder 15 mon.: how much should he pay now?

155. How many more permutations can be made with 9 things than with 8?

156. A contributed \$1400, B \$2200, C \$1875; B gained \$27.30 more than C: required the total gain.

157. Two merchants had each 40 gal. of wine at \$1.80 a gal.; they wish to make it worth \$1.20 a gal.; one pours in water, the other alcohol at 40 ct. a gal.: how many more gal. in one mixture than in the other?

158. The first term of a geometric series is 3, the third term 507: find the ratio.

159. A man has a pile of wood 33 ft. 9 in. long, 20 ft. wide, and 5 ft. high: if it is piled in a cubical form, how high will it be?

160. Find the surface of a sphere whose solidity is 65.45 cu. in.

161. A debt was paid with interest Aug. 18, 1857; had it been paid May 12, 1859, there would have been due \$26 more: what was the original debt?

162. At what discount must I buy stocks, so that by selling at 2 % premium, I may gain 20 % on my investment?

163. A, B, and C were in partnership: A contributed \$420, B \$580; they gain \$1200, of which C receives \$450: find A's share of the gain.

164. Find the surface of a sphere whose circumference is 39.27 in.









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